APPENDIX K

HUMAN HEALTH AND ECOLOGICAL RECEPTOR SEDIMENT CLEANUP OBJECTIVE AND CLEANUP SCREENING LEVEL DEVELOPMENT

Description: Presents the development of human health risk-based concentrations of bioaccumulative COCs used to inform the selection of the SCOs and CSLs. This Appendix also describes the selection of bioaccumulative COCs, the assessment of potential ecological risk, the development of natural background and regional background COC concentrations, and the application of PQLs.

JELD-WEN, INC.

HUMAN HEALTH AND ECOLOGICAL RECEPTOR SEDIMENT CLEANUP OBJECTIVE AND CLEANUP SCREENING LEVEL DEVELOPMENT

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March 2021

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LIST OF ACRONYMS AND ABBREVIATIONS

BSAF	Biota Sediment Accumulation Factor
cm^2	square centimeter
COC	chemical of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CPF	cancer potency factor
CSL	cleanup screening level
Ecology	Washington State Department of Ecology
ELCR	excess lifetime cancer risk
FS	Feasibility Study
g/day	gram per day
HQ	hazard quotient
kg	kilogram
mg/cm^2-day	milligrams per square centimeter per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
OSV	Ocean Survey Vessel
PCB	polychlorinated biphenyl
PQL	practical quantitation limit
RBC	risk-based concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
SCO	sediment cleanup objective
SCUM	Sediment Cleanup Users Manual
Site	JELD-WEN, inc., former E.A. Nord, Inc., door facility
SMS	Sediment Management Standards
TCDD	tetrachlorodibenzo-*p*-dioxin

TEF	Toxicity Equivalency Factor
TEQ	Toxic Equivalents Quotient
TTL	target tissue level
WAC	Washington Administrative Code

1 INTRODUCTION

This Appendix presents the development of human health risk-based concentrations (RBCs) of bioaccumulative chemicals of concern (COCs) for the former E.A. Nord, Inc., door facility (through its successor, JELD-WEN, inc.; Site). These human health RBCs contribute to the selection of the sediment cleanup objectives (SCOs) and cleanup screening level (CSLs) described in Section 6.1.1.3 of the Remedial Investigation (RI)/Feasibility Study (FS). This Appendix also describes the selection of bioaccumulative COCs, the assessment of potential ecological risk, the development of natural background and regional background COC concentrations, and the application of practical quantitation limits (PQLs).

Sediment sites are regulated by the Sediment Management Standards (SMS; Washington Administrative Code [WAC] 173-204). The revised SMS rule took effect on September 1, 2013 (Ecology 2013) and includes specific requirements for the protection of human health and the environment. The SMS rule includes specific procedures to determine human health risk-based SCOs and CSLs to address the bioaccumulative (seafood consumption) and direct contact exposure pathways (WAC 173-204-561). Under the SMS rule, the derivation of human health sediment RBCs is a component of the overall sediment cleanup level development. The SMS permits site risk-based cleanup standards within a range of 1 in 100,000 (1×10^{-5}) to 1 in 1 million (1×10^{-6}) excess lifetime cancer risk (ELCR) levels for all individual carcinogens and a total ELCR risk of 1×10^{-5} for all carcinogens (total risk from multiple contaminants). For non-carcinogenic chemicals, a hazard quotient (HQ) of 1 is used to develop cleanup standards. If a site has multiple non-carcinogens with similar types of toxicity, the cleanup standards may be adjusted downward in accordance with WAC 173-340-708 or other approved methods to ensure protectiveness at a hazard index of 1.

The human health risk-based SCO is the lowest sediment RBC developed from the 1×10^{-6} ELCR[1] threshold and/or an HQ of 1[2]. The human health risk-based CSL is the lowest sediment RBC corresponding to a 1×10^{-5} ELCR threshold and/or an HQ of 1[2]. The final SCO and CSL are determined based on the highest of the following: 1) lowest appropriate RBCs

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[1] Or $1\text{x}10^{-5}$ for multiple carcinogens

[2] Or a hazard index of 1 for multiple non-carcinogens

for protection of human health, benthic organisms (WAC 173-204-320 and WAC 173-204-562 for SCO and CSL, respectively), or higher trophic level ecological receptors; 2) natural background; and 3) PQLs. The SMS contains SCO and CSL criteria for benthic organisms, as presented in Section 4.2.2 of the RI/FS. As discussed in Section 3.2 of this Appendix, an SCO and CSL were not developed for higher trophic level ecological receptors because the human health SCO and CSL, which are based on the Tulalip Tribes subsistence exposure parameters (EPA 2013), are adequately protective of higher trophic level species.

The final cleanup level may be adjusted upward from the SCO, if the SCO is not technically possible to achieve, considering net environmental effects on the aquatic environment, natural resources, and habitat. However, the cleanup level may not be adjusted upward above the CSL (WAC 173-204-560).

As described in the SMS rule and the Sediment Cleanup Users Manual (SCUM; Ecology 2019) guidance document, the steps for developing human health risk-based CSLs and SCOs based on Biota Sediment Accumulation Factors (BSAFs) for the Site are as follows:

- Identify Site bioaccumulative chemicals requiring RBC development (Ecology 2019).
- Identify potential exposure pathways and the reasonable maximum exposure (RME) scenario (WAC 173-204-561(2)).
- Calculate carcinogenic sediment RBCs at $1x10^{-6}$ (SCO) and $1x10^{-5}$ (CSL) levels and apply early life exposure calculations for carcinogenic polycyclic aromatic hydrocarbons (cPAHs).
- Calculate non-carcinogenic RBCs using an HQ of 1.
- Determine the lowest risk-based tissue concentrations, considering all exposure pathways present to calculate the subtidal risk-based sediment concentration based on fish/shellfish consumption.
- Determine the lowest intertidal risk-based sediment concentration based on direct contact.
- Determine natural background.
- Determine the PQL.

This document is generally organized according to these steps and includes the following sections:

- Section 2 identifies Site bioaccumulative COCs requiring development of a bioaccumulative exposure pathway (seafood consumption) RBC.
- Section 3 identifies complete Site exposure pathways and discusses RME scenarios including the Tulalip Tribes shellfish consumption and direct contact during beach play and shellfishing scenarios.
- Section 4 includes components of SCO development. This section provides equations for calculating RBCs for the exposure scenarios and discusses natural background and PQLs.
- Section 5 includes components of CSL development. This section provides the development of estimated preliminary regional background values.

2 IDENTIFICATION OF SITE BIOACCUMULATIVE CHEMICALS OF CONCERN

Site bioaccumulative COCs requiring the development of sediment RBC were identified in RI/FS Sections 4.2.2 and 4.6.3. Bioaccumulative chemicals associated with the Site include dioxin/furans evaluated as 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) Toxic Equivalents Quotient (TEQ)[3], total polychlorinated biphenyl (PCB) congeners, and PCB TEQ[4]. Total cPAHs evaluated as benzo(a)pyrene TEQ[4] were also evaluated for completeness. Of these bioaccumulative COCs, total dioxin/furan TEQ and total PCB congeners are considered the Site indicator hazardous substances. Site areas with elevated PCB TEQ and cPAH TEQ are within the footprint of prospective remedial actions defined by dioxin/furan TEQ and total PCB congener concentrations, as discussed in Section 4.5.3 of the RI/FS. For completeness, SCO and CSL have been developed for all the bioaccumulative chemicals in the following sections. Only the RBC developed for total PCB congeners and dioxin/furan TEQ will be used to develop remediation levels for the Site.

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[3] Using the mammalian Toxicity Equivalency Factor (TEF) from Van den Berg et al. (2006)

[4] Using the California Environmental Protection Agency (CalEPA 2005) mammalian TEFs

3 EXPOSURE PATHWAYS AND REASONABLE MAXIMUM EXPOSURE SCENARIOS

RBCs have been calculated for Site exposure pathways for both carcinogenic and non-carcinogenic risk, as applicable. This section describes the exposure pathways used to calculate the RBCs.

The following potential existing and/or future human health exposure pathways were identified at the Site:

- Ingestion of shellfish that have bioaccumulated chemicals from the Site, using tribal consumption rates that are protective of other subsistence and recreational consumers. The following scenarios for consumption of fish and shellfish were evaluated:
    - Tribal adult consumer of fish (excluding anadromous) and shellfish
    - Tribal child consumer of fish and shellfish including incorporation of early life exposure to cPAHs using Age-Dependent Adjust Factors since they are identified as having a mutagenic mode of action
    - A scenario that combines risks from both childhood and adulthood exposure (i.e., lifetime exposure risks calculated from 6 years as a child and 64 years as an adult)

- The following direct sediment contact (incidental sediment ingestion and dermal contact) during beach play and shellfish collection scenarios were evaluated:
    - Tribal adult clam diggers
    - Tribal adult net fishers
    - Child beach play scenario

The adult tribal clamming RME scenario refers to the highest exposure for human health risk that is reasonably expected to occur at a site under current and potential future land use (WAC 173-204-561(2)(b)). This RME scenario was developed for the Site based on the Washington State Department of Ecology (Ecology) guidance (Ecology 2019). The adult tribal consumption rates are protective of other subsistence and recreational fishermen.

3.1 Ingestion of Shellfish

Sediment RBCs were developed that are protective of tribal RME shellfish consumption from the Site. The sediment RBCs were developed as part of the process in establishing human health SCOs and CSLs for Site bioaccumulative COCs. The RBCs were calculated using Ecology's default equations (Ecology 2019) and a combination of Ecology's recommended input parameters (e.g., exposure frequency and exposure duration) and site-specific input parameters (e.g., Tulalip Tribes shellfish ingestion rate and body weight). For a given chemical, carcinogenic and non-carcinogenic, if applicable, RBCs were developed based on the chemical's toxicological mechanisms of action. The RBCs developed are the concentrations in sediment at and below which chemicals would not be expected to accumulate in shellfish tissue to levels presenting potential unacceptable risk to human consumers under RME conditions. The equations and site-specific parameters used for calculating the shellfish consumption RBC are presented in Section 4.1.1. The RBC input parameters are included in Tables K-1 and K-2.

3.2 Sediment Direct Contact and Incidental Ingestion Scenario

The direct contact and incidental ingestion exposure pathways were evaluated through the adult tribal clamming scenario. The clamming scenario was used to derive RBCs for adult subsistence activities in the intertidal portion of the Site (0 to +14 feet mean lower low water). The RBCs protective of the direct contact and incidental ingestion scenario were calculated using Ecology's default equations (Ecology 2019) and a combination of Ecology's recommended input parameters (e.g., exposure duration and exposure frequency) and site-specific input parameters (e.g., adult body weight). Direct contact and incidental ingestion RBCs were developed for the Site bioaccumulative COCs. For a given chemical, carcinogenic and non-carcinogenic, if applicable, RBCs were developed based on the chemical's toxicological mechanisms of action. The direct contact and incidental ingestion equations and site-specific parameters used for calculating the RBCs are presented in Section 4.1.2. The input parameters are included in Tables K-2 and K-3.

3.3 Ecological Receptors

Ecological risk from exposure to bioaccumulative chemicals is also considered in the development of SCO and CSL for a site (Ecology 2019). Ecology (2019) provides a screening process to determine whether RBC for higher trophic levels needs to be calculated or whether RBC developed for human health will also be protective of higher trophic level species. The screening process evaluates: 1) whether the chemicals may pose a greater risk to higher trophic level species than to humans; 2) if the human health RBC is a background or PQL value; and 3) whether resources of special concern exist at the Site. If Site bioaccumulative chemicals do not present a greater risk to ecological receptors than to humans, and/or human health-based RBC are background concentrations or PQL, and if resources of special concern are not present at the Site, the risk to higher trophic level ecological receptors does not need to be separately evaluated.

Following the screening process, the RBCs developed for human health are anticipated to be adequately protective of higher-trophic level aquatic-dependent wildlife (e.g., otters) that may be exposed to bioaccumulative chemicals (through foraging) at the Site. None of the Site bioaccumulative COCs evaluated are included in Ecology's list of chemicals that present a greater risk to higher trophic species than to humans (Ecology 2019). The dioxin/furan TEQ and the cPAH TEQ SCO[5] are the PQL and background concentration, respectively, indicating that these chemicals do not need to be further evaluated for risk to higher trophic level species (Ecology 2019). Only the total PCB congener and PCB TEQ SCO are human health risk-based values. Given the high tribal shellfish consumption rate used to develop the SCO, these values are also anticipated to be protective of higher trophic level species (Ecology 2019). In addition, PCB TEQ and cPAH TEQ are not considered Site indicator hazardous substances, and areas of elevated concentrations of these chemicals are within the prospective remedial footprint for elevated dioxin/furan TEQ and PCB congener concentrations. Lastly, no federally listed endangered species are present at the Site. Federally listed threatened species may migrate through the Site (see RI/FS Section 3.5) but are not expected to forage consistently at the Site.

As further indication that Site total PCB congener, PCB TEQ, and dioxin/furan TEQ concentrations do not pose unacceptable risk to higher trophic level species, the Site maximum detected clam tissue concentrations were compared to target tissue levels (TTLs). Human and aquatic-dependent wildlife bioaccumulative chemical TTLs have been developed

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[5] See Section 4

and are presented in the *Sediment Evaluation Framework for the Pacific Northwest* (RSET 2009) and the *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (ODEQ 2007). The TTLs represent the prey tissue concentrations considered protective of human health and aquatic-dependent wildlife. The compilation of available TTLs is included in Table K-4. Comparison of the human- and aquatic-dependent wildlife TTLs demonstrates that RBCs developed for human health would also be protective of aquatic dependent wildlife. The available human TTLs for PCBs and dioxin/furan TEQ are generally several orders of magnitude less than the aquatic-dependent wildlife TTLs, indicating that the sediment concentrations corresponding to the human TTL would be inclusively protective of aquatic-dependent wildlife. The Site maximum clam total PCB congener, dioxin/furan TEQ, and PCB TEQ concentrations are below the lowest ecological TTL, further indicating that risk to higher trophic level species from these bioaccumulative COCs does not need to be further evaluated at the Site.

4 SEDIMENT CLEANUP OBJECTIVE DEVELOPMENT

For a given chemical, the SCO is determined based on the highest of the following:

- The lowest appropriate RBCs for protection of human health for the 1×10^{-6} ELCR threshold and/or an HQ of 1
- Natural background
- PQLs

4.1 Risk-based Levels

Carcinogenic ELCR and non-carcinogenic health effects were evaluated separately because of differences in assumptions about the mechanism of these toxic effects. The toxicity values used to evaluate exposure to chemicals with non-carcinogenic and carcinogenic effects are reference doses (RfDs) and the cancer potency factors (CPFs), respectively. All toxicity values were taken from the CLARC database (Ecology 2020). The RfDs and CPFs are included in Table K-2.

Carcinogenic chemicals are assumed to have no threshold for carcinogenicity. Carcinogenic risks are presented as the chance of contracting cancer over a 70-year lifetime due to site-related exposure. These risks are considered by the U.S. Environmental Protection Agency to be excess cancer risks that are in addition to the national rates of cancer for the general population. Carcinogenic-based sediment screening values were calculated using 1x10^{-6} cancer risk, consistent with SMS guidance for developing human health-based SCO.

Chemicals exhibiting non-carcinogenic health effects are considered threshold chemicals, indicating that a critical chemical dose must be exceeded before adverse health effects occur. The potential for non-carcinogenic health effects to occur from exposure to a chemical is represented by the ratio of the estimated chemical intake to the RfD and is expressed as an HQ. Exposures resulting in an HQ less than or equal to 1 are unlikely to result in non-carcinogenic adverse health effects.

4.1.1 Shellfish Consumption Risk Levels

The seafood consumption pathway sediment RBCs were calculated using the Ecology default equations (Ecology 2019) as shown in Equations 4.1.a through 4.3. Equations 4.1.a, 4.1.b, and 4.2 were used to calculate the tissue RBCs for carcinogens, mutagenic carcinogens, and non-carcinogens, respectively. From Equations 4.1.a, 4.1.b, and 4.2, the corresponding sediment RBCs were calculated using Equation 4.3 (for non-polar organics; Ecology 2019).

Equation 4.1.a: Tissue RBC for carcinogens

$$RBC_{k,Tissue} = \left(\frac{ACR \times BW \times AT_{cr} \times UCF}{CPFo \times FCR_k \times FDF_k \times EF \times ED}\right)$$

Equation 4.1.b: Tissue RBC for mutagenic carcinogens. See Table K-1 for age-dependent values

$$FCR_{child-adj}\left(\frac{mg}{kg}\right) = \frac{FCR_{0-2} \times ED_{0-2} \times EF_{0-2} \times ADAF_{0-2}}{BW_{0-2}} + (2\text{-}6yr, 6\text{-}16yr, 16\text{-}70yr)$$

$$RBC_{mutagen}\left(\frac{mg}{kg}\right) = (ACR \times AT_{cr} \times UCF)/(CPF_o \times FCR_{child-adj} \times FDF)$$

Equation 4.2: Tissue RBC for non-carcinogens

$$RBC_{k,Tissue} = \left(\frac{HQ \times BW \times AT_{nc} \times UCF \times RfDo}{FCR_k \times FDF_k \times EF \times ED}\right)$$

Equation 4.3: Sediment RBC for non-polar organics

$$RBC_{k,Sed} = \left(RBC_{k,Tissue} \times \frac{S_{foc}}{SUF_k \times SL_k \times BSAF_k}\right)$$

where:

ACR = acceptable cancer risk (unitless)

$ADAF$ = age-dependent adjustment factor (unitless)

AT_{cr} = cancer averaging time (days)

AT_{nc} = non-cancer averaging time (days)

$BSAF_k$ = biota sediment accumulation factor for k^{th} seafood type (grams of organic carbon/gram of lipid)

BW = body weight (kilograms [kg])

$CPFo$ = oral cancer potency factor (milligrams per kilogram per day [mg/kg-day])$^{-1}$

EF = exposure frequency (days/year)

ED = exposure duration (years)

FCR_k = consumption rate of k^{th} seafood type (grams/day)

FDF_k = diet fraction of k^{th} seafood type (unitless)

HQ = hazard quotient (unitless)

$RBC_{k,Tissue}$= tissue risk-based concentration for k^{th} seafood type (milligrams per kilogram [mg/kg])

$RBC_{k,Sed}$ = sediment risk-based concentration corresponding to the $RBC_{k,Tissue}$ (mg/kg)

$RfDo$ = oral reference dose (mg/kg-day)

S_{foc} = fraction sediment organic carbon (gram/gram)

SL_k = lipid fraction of k^{th}seafood type (gram/gram)

SUF_k = site use factor of k^{th} seafood type (proportion)

UCF = unit conversion factor (1,000 grams/kg)

Values for each of the listed parameters are presented in Tables K-1, K-2, and K-3 a. The SCO RBCs are presented in Table K-5.

4.1.1.1 Site-specific Parameters

The site-specific parameters used in the shellfish consumption risk equation are described below. The Ecology-recommended values for all other parameters were used. All parameters used are included in Tables K-1 and K-2.

4.1.1.1.1 Shellfish Consumption Rate

The Site is within the Tulalip Tribes Usual and Accustomed Fishing Area and includes an intertidal area that could be used for clamming. The adult fish consumption rate of 186 grams per day (g/day) is based on the 95th percentile consumption rate for the Tulalip Tribes for pelagic fish, bottom fish, and shellfish (see Table 5 of EPA 2013). The child fish consumption rate of 81 g/day is 44 percent of the adult consumption rate. The child consumption rate is 44 percent less than the adult when comparing mean consumptions rates for total fish (see Tables D-2 and D-19 of EPA 2013)..

4.1.1.1.2 Body Weight

An adult body weight of 81 kg was used for Tulalip Tribes members (EPA 2013). The body weights for other age groups are provided in Table K-1.

4.1.1.1.3 Cancer Potency Factors and Reference Doses

Shellfish consumption RBCs were developed for the Site bioaccumulative COCs using CPF and RfD from the CLARC database (Ecology 2020). The benzo(a)pyrene CPF was used for cPAH TEQ, the 2,3,7,8-TCDD CPF and RfD were used for dioxin/furan TEQ and PCB TEQ, and the aroclor 1254 CPF and RfD were used for total PCB Congeners. Age-dependent adjustment factors for calculating risk from early life exposures to the mutagenic carcinogen cPAH are provided in Table K-1. The CPF and RfD are included in Table K-2.

4.1.1.1.4 Biota Sediment Accumulation Factors

The extent of aquatic biota bioaccumulation of non-polar chemicals from sediment is typically expressed using BSAF. The BSAF is the ratio between the concentration of a non-polar organic chemical in the total extractable lipids of an organism (normalized to the lipid fraction), to the concentration in sediment normalized to the organic carbon content of sediment. Site-specific BSAFs were developed for the bioaccumulative COCs as described in Section 4.4.1 of the RI/FS. These BSAFs were used to develop sediment RBC from the tissue RBC. The BSAF is based on site-specific clam tissue data and assumed to be representative of bioaccumulation in pelagic and bottom fish that are included in the shellfish consumption rate. The BSAFs are included in Table K-2.

4.1.1.1.5 Shellfish Lipid Content

A shellfish lipid fraction of 0.0051 gram/gram was used. This is the average lipid fraction of Site clam samples EA01 and EA10.

4.1.1.1.6 Sediment Fraction Organic Carbon

The Site surface sediment samples mean fraction of organic carbon of 0.0223 gram/gram was used for RBC development.

4.1.2 Direct Contact

For the incidental ingestion and dermal contact pathways, Equations 4.4, 4.5, and 4.6 (Ecology 2019) were used to calculate the carcinogenic, carcinogenic-mutagenic,and non-carcinogenic sediment RBCs, respectively.

Equation 4.4: Direct contact RBC for carcinogens

$$RBC_{cancer} = \left(\frac{ACR \times BW \times AT_{cr}}{EF \times ED \times \left[\left(\frac{IR \times AB \times CPFo}{UCF} \right) + \left(\frac{SA \times AF \times ABS \times CPFd}{UCF} \right) \right]} \right)$$

where:

ACR = acceptable cancer risk (unitless)

AB = gastrointestinal absorption factor (unitless)

ABS = dermal absorption factor (unitless)

AF = sediment to skin adherence factor (milligrams/square centimeter per day [mg/cm^2-day])

AT_{cr} = cancer averaging time (days)

BW = body weight (kg)

$CPFd$ = dermal cancer potency factor (mg/kg-day)$^{-1}$ (see Equation 4.7)

$CPFo$ = oral cancer potency factor (mg/kg-day)$^{-1}$

EF = exposure frequency (days/year)

ED = exposure duration (years)

IR = ingestion rate (mg/day)

RBC_{cancer} = sediment risk-based concentration for carcinogenic mechanism of toxicity (mg/kg)

SA = dermal surface area (square centimeters [cm$^{2]}$)

UCF = conversion factor (1,000,000 mg/kg)

Equation 4.5: Direct contact RBC for mutagenic carcinogens

$$IRF_{child-adj}\left(\frac{mg}{kg}\right) = \frac{IRF_{0-2} \times ED_{0-2} \times EF_{0-2} \times ADAF_{0-2}}{BW_{0-2}} + (2\text{-}6yr, 6\text{-}16yr, 16\text{-}70yr)$$

$$DF_{child-adj}\left(\frac{mg}{kg}\right) = \frac{SA_{0-2} \times ED_{0-2} \times EF_{0-2} \times AF_{0-2} \times ADAF_{0-2}}{BW_{0-2}} + (2\text{-}6yr, 6\text{-}16yr, 16\text{-}70yr)$$

$$SCL_{mutagen}(\frac{mg}{kg}) = \frac{ACR \times AT_{cr} \times UCF}{[(IRF_{child-adj} \times AB \times CPF_o) + (DF_{child-adj} \times ABS \times CPF_d)]}$$

where:

AB = gastrointestinal absorption factor (unitless)

ABS = dermal absorption factor (unitless)

ACR = acceptable cancer risk (unitless; 1 in 1,000,000)

$ADAF$ = age-dependent adjustment factor (unitless)

AF = sediment-to-skin adherence factor (mg/cm^2/day)

AT = averaging time (70 x 365 days/year)

BW = body weight (kg)

$CPFo$ = oral cancer potency factor (mg/kg·day)$^{-1}$

$CPFd$ = cancer potency factor adjusted for dermal exposure (mg/kg/day)$^{-1}$

$DF_{child\text{-}adj}$ = child mutagenic dermal factor – age adjusted (mg/kg)

ED = exposure duration (year)

EF = exposure frequency (day/year)

$IRF_{child\text{-}adj}$ = age adjusted child ingestion factor (mg/kg)

IR = ingestion rate (mg/day)

SA = dermal surface area (cm^2)

SCL = risk-based sediment cleanup level concentration (mg/kg dry weight)

UCF = unit conversion factor (1,000,000 mg/kg)

Equation 4.6: Direct contact RBC for non-carcinogens

$$RBC_{Noncancer} = \left(\frac{HQ \times BW \times AT_{nc}}{EF \times ED \times \left[\left(\left(\frac{1}{RfDo} \right) \times \left(\frac{IR \times AB}{UCF} \right) \right) + \left(\left(\frac{1}{RfDd} \right) \times \left(\frac{SA \times AF \times ABS}{UCF} \right) \right) \right]} \right)$$

where:

AB = gastrointestinal absorption fraction (unitless)

ABS = dermal absorption fraction (unitless)

AF = sediment to skin adherence factor (mg/cm^2-day)

AT_{nc} = non-cancer averaging time (days)

BW = body weight (kg)

EF = exposure frequency (days/year)

ED = exposure duration (years)

HQ = hazard quotient (unitless)

IR = ingestion rate (mg/day)

$RBC_{Noncancer}$ = risk-based concentration for non-carcinogenic mechanism of toxicity (mg/kg)

$RfDd$ = dermal reference dose (mg/kg-day) (See Equation 4.8)

$RfDo$ = oral reference dose (mg/kg-day)

SA = dermal surface area (cm^2)

UCF = conversion factor (1,000,000 mg/kg)

The calculation of dermal CPF and RfD used the shellfish consumption and direct contact RBCs that are included in Equations 4.7 and 4.8, respectively.

Equation 4.7: Dermal cancer potency factor calculation

$$CPFd = \frac{CPFo}{GI}$$

where:

$CPFo$ = oral cancer potency factor (mg/kg-day)$^{-1}$

$CPFd$ = dermal cancer potency factor (mg/kg-day)$^{-1}$

GI = gastrointestinal conversion factor (unitless)

Equation 4.8: Dermal reference dose calculation

$$RfDd = RfDo \times GI$$

where:

$RfDd$ = dermal reference dose (mg/kg-day)

$RfDo$ = oral reference dose (mg/kg-day)

GI = gastrointestinal conversion factor (unitless)

Values for each of the listed parameters are presented in Tables K-1, K-2, and K-3b. The SCO RBCs are presented in Table K-5.

4.1.2.1 Site-specific Parameters

The site-specific parameters for exposure duration, exposure frequency, body weight, and the cancer and non-cancer toxicity values for the tribal shellfish harvesting and beach play scenarios described in Section 4.1.1 are also used in the incidental ingestion and dermal contact risk equations. The Ecology-recommended values were used for skin surface area. All parameters used are included in Tables K-1, K-2, and K-3b.

4.2 Practical Quantitation Limit

SMS allows consideration of the PQL in establishing the cleanup levels when a COC concentration determined to be protective cannot be reliably detected using state-of-the-art, currently available analytical instruments and methods (WAC 173-204-505(15)). In simpler terms, the PQL is the minimum concentration for an analyte that can be reported with a high degree of certainty. If a natural background or the risk-based SCO is below the concentration at which a contaminant can be reliably quantified, then the SCO for that contaminant may default to the analytical PQL. The Model Toxics Control Act defines the PQL as the following:

> *"…the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using department approved methods."* (WAC 173-340-200)

Table K-5 includes the PQLs. These PQLs are based on the programmatic PQL values presented in SCUM Table 11-1 (Ecology 2019) for cPAH TEQ, dioxin/furan TEQ, and PCB TEQ.

4.3 Natural Background

Natural background values were adopted from the SCUM Table 10-1 (Ecology 2019) for cPAH TEQ, dioxin/furan TEQ, and PCB TEQ and the Port Gardner Regional Background Phase II Supplemental Sampling Presentation (Ecology 2014b) for PCB congeners. These natural background concentrations were derived as the 90/90 upper tolerance limit of the Ocean Survey Vessel (OSV) Bold Survey data (DMMP 2009) and additional datasets selected by Ecology (collectively referred to as the "BOLD Plus" dataset; Ecology 2019). Natural background concentrations are included in Table K-5.

5 CLEANUP SCREENING LEVEL DEVELOPMENT

For a given chemical, the CSL is based on the highest of the following:

- The lowest appropriate RBC for protection of human health corresponding to a 1×10^{-5} ELCR threshold and/or an HQ of 1, benthic organisms (WAC 173-204-562 for CSL), or ecological receptors
- Regional background
- PQLs

5.1 Risk-based Levels

The methods for developing human health CSL RBCs were similar to methods used to calculate SCO RBCs, as described in Section 4, with the exception that a target cancer risk of $1x10^{-5}$ is used for carcinogenic chemicals instead of $1x10^{-6}$. An HQ of 1 is used for development of both the SCO and CSL RBCs, and the RBCs for non-carcinogens will therefore be the same for the SCO and CSL. The CSL RBCs are included in Table K-5.

5.2 PQL

The PQLs are described in Section 4.2. The PQLs are the same for the development of both the SCO and CSL.

5.3 Preliminary Regional Background

The SMS define regional background as follows:

> *"WAC 173-204-505(16)*
> *Regional background means the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse nonpoint sources, such as atmospheric deposition or storm water, not attributable to a specific source or release. See WAC 173-204-560(5) for the procedures and requirements for establishing regional background."*

Diffuse non-point sources for key bioaccumulative chemicals (dioxin/furan and cPAH) include urban inputs from ongoing combustion (e.g., trucks and automobiles) and ongoing inputs from historical combustion (e.g., erosion and atmospheric deposition from historical sources). The regional background has been developed for Port Gardner as presented in the *Port Gardner Bay Regional Background Sediment Characterization* (Ecology 2014c) for cPAH TEQ, dioxin/furan TEQ, and PCB TEQ and in the *Port Gardner Regional Background Phase II Supplemental Sampling* presentation (Ecology 2014b) for PCB congeners. Regional background concentrations are included in Table K-5.

6 SUMMARY

The human health RBCs and background concentrations derived following methods described in this Appendix to the RI/FS have been included in the development of the SCOs and CSLs for the Site. The human health RBCs, natural and regional background values, and PQLs are included in Table K-5. These values are referenced in Section 6.1.1.3 of the RI/FS.

7 REFERENCES

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TABLES

Table K-1

Risk Parameters and Exposure Pathways Used for Calculating Risk-Based Sediment Concentrations for Early Life Exposure to cPAHs

	Life Stages (Age Groups, years)			
Risk Parameters	**0-2**	**2-6**	**6-16**	**16-70**
Age Dependent Adjustment Factor for cPAHs (unitless)	10	3	3	1
Body Weight (kg)	10	17	44	81
Dermal Exposure Areasa (cm^2)	1952	2591	2161	3407
Fish Consumption Rate Factor (g/day)	81	81	186	186

Notes:

cm^2 = square centimeters

cPAH = carcinogenic polycyclic aromatic hydrocarbon

g/day = gram per day

kg = kilogram

Table K-2
Bioaccumulative Chemical Toxicity Values and Site-specific Shellfish Biota Sediment Accumulation Factors

Chemical	CPF (mg/kg-day^{-1})	RfD (mg/kg-day)	Clam BSAF (g-OC/g lipid)
cPAH TEQ	1.0E+00	3.0E-04	0.67
Dioxin/furan TEQ	1.3E+05	7E-10	0.06
PCB TEQ	1.3E+05	7E-10	0.01
Total PCB congener	2.E+00	2.E-05	0.032

Notes:

BSAF = Biota Sediment Accumulation Factor

cPAH = carcinogenic polycyclic aromatic hydrocarbon

CPF = oral cancer potency factor

g-OC/g-lipid = grams of organic carbon per gram of lipid

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilograms per day

PCB = polychlorinated biphenyl

RfD = oral reference dose

TEQ = Toxic Equivalents Quotient

Table K-3a
Shellfish Consumption RBC Equation Parameters

Parameter Abbreviation	Parameter Name	Value	Units	Source
ACR	Acceptable Cancer Risk for Individual Carcinogens	1.00E-06	unitless	Ecology-recommended value (2019)
AT_C	Averaging Time Carcinogen	25,550	days	Ecology-recommended value (2019)
AT_{NC}	Averaging Time Non-carcinogen	25,550	days	Ecology-recommended value (2019)
BSAF	Biota Sediment Accumulation Factor	See Table 9-2	g-OC/g-lipid	Site-specific
BW	Body Weight Adult	See Table 9-1	kg	Tulalip Tribe (Ecology 2019)
CPFo	Cancer Potency Factor (oral)	See Table 9-2	$mg/kg\text{-}day^{-1}$	CLARC (Ecology 2020)
ED	Exposure Duration	70	years	Ecology-recommended value (2019)
EF	Exposure Frequency	365	days/year	Ecology-recommended value (2019)
FCR	Shellfish Consumption Rate (clam)	See Table 9-1	grams/day	Adult Tulalip tribal 95% shellfish consumption from Puget Sound (Ecology 2013)
FDF	Shellfish Diet Fraction	1	proportion	Ecology (2019)
HQ	Hazard Quotient	1	unitless	Ecology (2019)
RfDo	Reference Dose (oral)	See Table 9-2	mg/kg-day	CLARC (Ecology 2020)
Sfoc	Fraction of Organic Carbon in Sediment	0.0223	gram/gram	Site average fraction organic carbon
SL	Shellfish Lipid Fraction (clam)	0.0051	gram/gram	Average of site clam samples EA01 and EA10
SUF	Site Use Factor (clam)	1	proportion	Ecology-recommended value (2019)
UCF	Unit Conversion Factor	1,000	g/kg	Ecology (2019)

Notes:

CLARC = Cleanup Levels and Risk Calculations (Ecology 2015b)

g = gram

g/kg = grams per kilogram

g-OC/g-lipid = grams of organic carbon per gram of lipid

kg = kilogram

mg/kg = milligrams per kilogram

mg/kg-day = milligrams per kilogram per day

$mg/kg\text{-}day^{-1}$= milligrams per kilograms per day

RBC = risk-based concentration

Table K-3b
Sediment Direct Contact RBC Equation Parameters

Parameter Abbreviation	Parameter Name	Value	Units	Source
ACR	Acceptable Cancer Risk for Individual Carcinogens	1.00E-06	unitless	Ecology-recommended value (2019)
AB	Gastrointestinal Absorption Fraction (soil)	1 0.6 for mixtures of dioxins/furans	unitless	Ecology-recommended values (2019; WAC 173-340-735 [Equation 745-5])
ABS	Dermal Absorption Fraction	0.03 for dioxins/furans 0.1 for other organic hazardous substances	unitless	Ecology (2019; WAC 173-340-745 [Equation 745-5])
AF	Sediment to Skin Adherence Factor Adult (clam digging)	0.6	mg/cm^2-day	Ecology-recommended value (2019)
AT_C	Averaging Time Cancer	25,550	days	Ecology-recommended value (2019)
AT_{NC}	Averaging Time Non-cancer	25,550	days	Ecology-recommended value (2019)
BW	Body Weight Adult (clam digging)	See Table 9-1	kg	Tulalip Tribe (Ecology 2019)
CPFd	Cancer Potency Factor (dermal)	chemical-specific	mg/kg-day^{-1}	Calculated (CPFo/GI)
CPFo	Cancer Potency Factor (oral)	chemical-specific	mg/kg-day^{-1}	CLARC (Ecology 2020)
ED	Exposure Duration (incidental ingestion and dermal contact) Adult (clam digging)	70	years	Ecology-recommended value (2019)
EF	Exposure Frequency	120	days/year	Ecology-recommended value (2019)
GI	Gastrointestinal Absorption Fraction	0.8 for dioxins/furans 0.5 for other organic hazardous substances	unitless	Ecology-recommended values (2019; WAC 173-340-740 [Equation 740-5])
HQ	Hazard Quotient	1	unitless	Ecology-recommended value (2019)
IR	Ingestion Rate (sediment)	100	mg/day	Ecology-recommended value (2019)
RfDd	Reference Dose (dermal)	chemical-specific	mg/kg-day	Calculated (RfDo*GI)
RfDo	Reference Dose (oral)	chemical-specific	mg/kg-day	CLARC (Ecology 2020)
SA	Dermal Surface Area Adult	See Table 9-1	cm^2	Ecology-recommended value (2019)
UCF	Unit Conversion Factor (incidental ingestion and dermal contact)	1,000,000	mg/kg	Ecology (2019)

Table K-3b
Sediment Direct Contact RBC Equation Parameters

Notes:

CLARC = Cleanup Levels and Risk Calculations (Ecology 2015b)
cm^2 = square centimeter
mg/day = milligrams per day
mg/cm^2-day = milligrams per square centimeter per day
mg/kg-day = milligrams per kilogram per day
$mg/kg\text{-}day^{-1}$ = milligrams per kilograms per day
RBC = risk-based concentration
WAC = Washington Administrative Code

Table K-4
Human and Wildlife Target Tissue Levels (mg/kg wet weight)

	Sediment Evaluation Framework for the Pacific Northwest[a]			Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment[b]						
Bioaccumulative Chemical	**Nearshore ESA Aquatic-dependent Wildlife**	**Nearshore Population Aquatic-dependent Wildlife**	**Human Health[c]**	**Bird Individuals**	**Bird Populations**	**Mammals Individuals**	**Mammal Population**	**Human Health[d]**	**Maximum Detected Site Clam Tissue Concentration**	**Sample ID**
Total PCB Aroclors	0.04	0.18	6.E-05	1.1	3.4	0.88	1.7	6.E-04	4.25E-03 Total PCB Congeners[e]	JW-EA01-TISSUE-120516
Dioxin/furan TEQ	5.E-07	8.5E-06	9.2E-10	8.E-06	4.E-05	5.8E-07	1.6E-05	7.6E-09	2.3E-07 Dioxin/furan TEQ[e,f] 8.2E-08 PCB TEQ[e,f]	JW-EA10-TISSUE-120516 JW-TISSUE-01-140428

Notes:
ESA = Endangered Species Act
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
TEQ = Toxic Equivalents Quotient
a RSET 2009
b ODEQ 2007
c TTL3 protective of high-end tribal consumption
d Lower of carcinogen or non-carcinogen subsistence tribal
e Totals were summed with non-detects equaling 1/2 the detection limit
f TEQs were calculated using 2005 Mammalian Toxicity Equivalency Factor

Table K-5
Human Health Risk-based SCO and CSL

	Protection of Human Health						Natural Background[a] (mg/kg-dw)	Regional Background (Port Gardner; mg/kg-dw)[b]	Applicable PQL[c] (mg/kg-dw)
	Via Shellfish Consumption (Adult) (mg/kg-dw)			Via Direct Contact, Clamming (Adult) (mg/kg-dw)					
	Carcinogenic		Non-carcinogenic	Carcinogenic		Non-carcinogenic			
Analyte	**10-6, SCO_{HH}**	**10-5, SCO_{HH}**	**HQ=1, SCO_{HH} and CSL_{HH}**	**10-6, SCO_{HH}**	**10-5, SCO_{HH}**	**HQ=1, SCO_{HH} and CSL_{HH}**	**SCO_{NB}**	**CSL_{RB}**	**SCO_{PQL} and CSL_{PQL}**
Polycyclic Aromatic Hydrocarbons									
cPAH TEQ 1	9.3E-04	9.3E-03	8.5E-01	6.6E-01	6.6E+00	2.0E+02	2.1E-02	5.6E-02	9.0E-03
Polychlorinated Biphenyls									
Total PCB Congeners	3.0E-02	3.0E-01	1.2E+00	3.1E-01	3.1E+00	1.3E+01	3.0E-03	1.4E-02	1.0E-06
PCB TEQ	1.5E-06	1.5E-05	1.3E-04	1.5E-05	1.5E-04	1.4E-03	2.0E-07	3.8E-07	7.0E-07
Dioxins/furans									
Dioxin/furan TEQ	2.4E-07	2.4E-06	2.2E-05	1.5E-05	1.5E-04	1.4E-03	4.0E-06	4.0E-06	5.0E-06

Notes:

cPAH RBCs calculated assuming early life exo

-- = not applicable

cPAH = carcinogenic polycyclic aromatic hydrocarbon

CSL = cleanup screening level

HH = Human Health

HQ = hazard quotient

mg/kg-dw = milligrams per kilogram dry weight

NB = Natural Background

PCB = polychlorinated biphenyl

PQL = practical quantitation limit

RB = Regional Background

SCO = sediment cleanup objective

TEQ = Toxic Equivalents Quotient

a Natural background values are from BOLD Plus Regional Background values included in *Sediment Cleanup Users Manual* Table 10-1 (Ecology 2019) and the *Port Gardner Regional Background Phase II Supplemental Sampling Data Workshop* presentation (Ecology 2014b)

b Regional background values are from the *Port Gardner Bay Regional Background Sediment Characterization Report* (Ecology 2014c) and the *Port Gardner Regional Background Phase II Supplemental Sampling Data Workshop* presentation (Ecology 2014b)

c PQL are from SCUM Table 11-1 (Ecology 2019), and the PCB Congener PQL is based on average laboratory performance

ATTACHMENT K-1

ECOLOGY-PROVIDED MICROSOFT EXCEL SPREADSHEETS OF HUMAN HEALTH TISSUE AND SEDIMENT RISK-BASED CONCENTRATION CALCULATIONS

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
83-32-9	PAHs	acenaphthene						6.00E-02	I				4.80E+03		9.80E+01	5.00E+00		2.10E+05	
208-96-8	PAHs	acenaphthylene																	
30560-19-1	Pesticides	acephate						4.00E-03	I	8.70E-03	I		3.20E+02	1.10E+02				1.40E+04	1.50E+04
75-07-0	VOCs	acetaldehyde		2.57E-03	I	7.70E-03	I												
34256-82-1	Pesticides	acetochlor						2.00E-02	I				1.60E+03					7.00E+04	
67-64-1	VOCs	acetone		8.86E+00	A			9.00E-01	I				7.20E+04		2.90E+01	2.10E+00		3.20E+06	
75-86-5	VOCs	acetone cyanohydrin		5.71E-04	X														
75-05-8	VOCs	acetonitrile		1.71E-02	I														
98-86-2	SVOCs	acetophenone						1.00E-01	I				8.00E+03					3.50E+05	
62476-59-9	Herbicides	acifluorfen, sodium						1.30E-02	I				1.00E+03					4.60E+04	
107-02-8	VOCs	acrolein		5.71E-06	I			5.00E-04	I				4.00E+01					1.80E+03	
79-06-1	VOCs	acrylamide		1.71E-03	I	3.50E-01	I	2.00E-03	I	5.00E-01	I		1.60E+02	2.00E+00				7.00E+03	2.60E+02
79-10-7	VOCs	acrylic acid		2.86E-04	I			5.00E-01	I				4.00E+04					1.80E+06	
107-13-1	VOCs	acrylonitrile		5.71E-04	I	2.38E-01	I	4.00E-02	A	5.40E-01	I		3.20E+03	1.90E+00				1.40E+05	2.40E+02
15972-60-8	Pesticides	alachlor						1.00E-02	I	5.60E-02	C		8.00E+02	1.80E+01				3.50E+04	2.30E+03
1596-84-5	Pesticides	alar				1.79E-02	C	1.50E-01	I	1.80E-02	C		1.20E+04	5.60E+01				5.30E+05	7.30E+03
116-06-3	Pesticides (Carbamate)	aldicarb						1.00E-03	I				8.00E+01					3.50E+03	
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone						1.00E-03	I				8.00E+01					3.50E+03	
309-00-2	Pesticides	aldrin				1.72E+01	I	3.00E-05	I	1.70E+01	I		2.40E+00	5.90E-02	2.50E-03	1.30E-04		1.10E+02	7.70E+00
74223-64-6	Pesticides	ally						2.50E-01	I				2.00E+04					8.80E+05	
107-18-6	VOCs	allyl alcohol		2.86E-05	X			5.00E-03	I				4.00E+02					1.80E+04	
107-05-1	VOCs	allyl chloride		2.86E-04	I	2.10E-02	C			2.10E-02	C			4.80E+01					6.30E+03
7429-90-5	Metals	aluminum		1.43E-03	P			1.00E+00	P				8.00E+04					3.50E+06	
20859-73-8	Metals	aluminum phosphide						4.00E-04	I				3.20E+01					1.40E+03	
67485-29-4	Pesticides	amdro						3.00E-04	I				2.40E+01					1.10E+03	
834-12-8	Pesticides	ametryn						9.00E-03	I				7.20E+02					3.20E+04	
591-27-5	Phenols	aminophenol;m-						8.00E-02	P				6.40E+03					2.80E+05	
504-24-5	SVOCs	aminopyridine;4-																	
33089-61-1	Pesticides	amitraz						2.50E-03	I				2.00E+02					8.80E+03	
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES	1.40E-01	I														
7790-98-9	Perchlorates	ammonium perchlorate						7.00E-04	I				5.60E+01					2.50E+03	
7773-06-0	Pesticides	ammonium sulfamate						2.00E-01	I				1.60E+04					7.00E+05	
62-53-3	SVOCs	aniline		2.86E-04	I	5.60E-03	C	7.00E-03	P	5.70E-03	I		5.60E+02	1.80E+02				2.50E+04	2.30E+04
120-12-7	PAHs	anthracene						3.00E-01	I				2.40E+04		2.30E+03	1.10E+02		1.10E+06	
7440-36-0	Metals	antimony						4.00E-04	I				3.20E+01		5.40E+00	2.70E-01		1.40E+03	
1314-60-9	Metals	antimony pentoxide						5.00E-04	H				4.00E+01					1.80E+03	
28300-74-5	Metals	antimony potassium tartrate						9.00E-04	H				7.20E+01					3.20E+03	
1332-81-6	Metals	antimony tetroxide						4.00E-04	H				3.20E+01					1.40E+03	
1309-64-4	Metals	antimony trioxide		5.71E-05	I														
74115-24-5	Pesticides	apollo						1.30E-02	I				1.00E+03					4.60E+04	
140-57-8	SVOCs	aramite				2.49E-02	I	5.00E-02	H	2.50E-02	I		4.00E+03	4.00E+01				1.80E+05	5.30E+03
12674-11-2	PCBs	aroclor 1016				7.00E-02	S	7.00E-05	I	7.00E-02	S		5.60E+00	1.40E+01				2.50E+02	1.90E+03
11097-69-1	PCBs	aroclor 1254				2.00E+00	S	2.00E-05	I	2.00E+00	S		1.60E+00	5.00E-01				7.00E+01	6.60E+01
11096-82-5	PCBs	aroclor 1260				2.00E+00	S			2.00E+00	S			5.00E-01					6.60E+01
7440-38-2	Metals	arsenic, inorganic		4.29E-06	C	1.51E+01	I	3.00E-04	I	1.50E+00	I	2.00E+01	2.40E+01	6.70E-01	2.90E+00	1.50E-01	2.00E+01	1.10E+03	8.80E+01
7784-42-1	Metals	arsine		1.43E-05	I			3.50E-06	C				2.80E-01					1.20E+01	
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE			2.30E-01	I												
76578-14-8	Pesticides	assure						9.00E-03	I				7.20E+02					3.20E+04	
3337-71-1	Pesticides	asulam						5.00E-02	I				4.00E+03					1.80E+05	
1912-24-9	Pesticides	atrazine						3.50E-02	I	2.30E-01	C		2.80E+03	4.30E+00				1.20E+05	5.70E+02
65195-55-3	Pesticides	avermectin B1						4.00E-04	I				3.20E+01					1.40E+03	
103-33-3	Pesticides	azobenzene				1.09E-01	I			1.10E-01	I			9.10E+00					1.20E+03
7440-39-3	Metals	barium and compounds		1.43E-04	H			2.00E-01	I				1.60E+04		1.60E+03	8.30E+01		7.00E+05	
542-62-1	Metals	barium cyanide																	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	RfDi Inhalation Reference Dose (mg/kg-day)	Source	CPFi Inhalation Cancer Potency Factor (kg-day/mg)	Source	RfDo Oral Reference Dose (mg/kg-day)	Source	CPFo Oral Cancer Potency Factor (kg-day/mg)	Source	Soil Method A Unrestricted Land Use (mg/kg)	Soil Method B Non cancer (mg/kg)	Soil Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	Soil Protective of Groundwater Saturated see guidance (mg/kg)	Soil Method A Industrial Properties (mg/kg)	Soil Method C Non cancer (mg/kg)	Soil Method C Cancer (mg/kg)
114-26-1	Pesticides	baygon						4.00E-03	I				3.20E+02					1.40E+04	
43121-43-3	Pesticides	bayleton						3.00E-02	I				2.40E+03					1.10E+05	
68359-37-5	Pesticides	baythroid						2.50E-02	I				2.00E+03					8.80E+04	
1861-40-1	Pesticides	benefin						3.00E-01	I				2.40E+04					1.10E+06	
17804-35-2	Pesticides	benomyl						5.00E-02	I				4.00E+03					1.80E+05	
25057-89-0	Herbicides	bentazon						3.00E-02	I				2.40E+03					1.10E+05	
100-52-7	SVOCs	benzaldehyde						1.00E-01	I	4.00E-03	P		8.00E+03	2.50E+02				3.50E+05	3.30E+04
71-43-2	VOCs	BENZENE		8.57E-03	I	2.73E-02	I	4.00E-03	I	5.50E-02	I	3.00E-02	3.20E+02	1.80E+01	2.70E-02	1.70E-03	3.00E-02	1.40E+04	2.40E+03
108-98-5	SVOCs	benzenethiol						1.00E-03	P				8.00E+01					3.50E+03	
92-87-5	SVOCs	benzidine				2.35E+02	I	3.00E-03	I	2.30E+02	I		2.40E+02	4.30E-03				1.10E+04	5.70E-01
191-24-2	PAHs	benzo(g,h,i)perylene																	
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES			3.85E-01	C												
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES	5.70E-07	I	2.10E+00	I	3.00E-04	I	1.00E+00	I	1.00E-01	2.40E+01	1.90E-01	3.90E+00	1.90E-01	2.00E+00	1.10E+03	1.30E+02
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES			3.85E-01	C												
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES			3.85E-01	C												
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT					4.00E+00	I				3.20E+05		2.60E+02	1.80E+01		1.40E+07	
98-07-7	VOCs	benzotrichloride								1.30E+01	I			7.70E-02					1.00E+01
100-51-6	SVOCs	benzyl alcohol						1.00E-01	P				8.00E+03					3.50E+05	
100-44-7	VOCs	benzyl chloride		2.86E-04	P	1.72E-01	C	2.00E-03	P	1.70E-01	I		1.60E+02	5.90E+00				7.00E+03	7.70E+02
7440-41-7	Metals	beryllium		5.71E-06	I	8.40E+00	I	2.00E-03	I				1.60E+02		6.30E+01	3.20E+00		7.00E+03	
91-58-7	PAHs	beta-chloronaphthalene						8.00E-02	I				6.40E+03					2.80E+05	
141-66-2	SVOCs	bidrin						1.00E-04	I				8.00E+00					3.50E+02	
82657-04-3	Pesticides	biphenthrin						1.50E-02	I				1.20E+03					5.30E+04	
92-52-4	PAHs	biphenyl;1,1-		1.14E-04	X			5.00E-01	I	8.00E-03	I		4.00E+04	1.30E+02				1.80E+06	1.60E+04
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether				3.50E-02	H	4.00E-02	I	7.00E-02	H		3.20E+03	1.40E+01				1.40E+05	1.90E+03
111-44-4	SVOCs	bis(2-chloroethyl)ether				1.16E+00	I			1.10E+00	I			9.10E-01	2.20E-04	1.40E-05			1.20E+02
39638-32-9	VOCs	bis(2-chloroisopropyl) ether																	
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate				8.40E-03	C	2.00E-02	I	1.40E-02	I		1.60E+03	7.10E+01	1.30E+01	6.70E-01		7.00E+04	9.40E+03
542-88-1	VOCs	bis(chloromethyl)ether				2.17E+02	I			2.20E+02	I			4.50E-03					6.00E-01
80-05-7	Phenols	bisphenol a						5.00E-02	I				4.00E+03					1.80E+05	
7440-42-8	Metals	boron		5.71E-03	H			2.00E-01	I				1.60E+04					7.00E+05	
15541-45-4	Pesticides	bromate						4.00E-03	I	7.00E-01	I		3.20E+02	1.40E+00				1.40E+04	1.90E+02
79-08-3	SVOCs	bromoacetic acid																	
108-86-1	VOCs	bromobenzene		1.71E-02	I			8.00E-03	I					6.40E+02	5.60E-01	3.30E-02		2.80E+04	
75-27-4	VOCs	bromodichloromethane	TTHM NOTES			1.30E-01	C	2.00E-02	I	6.20E-02	I		1.60E+03	1.60E+01	3.70E-02	2.40E-03		7.00E+04	2.10E+03
593-60-2	VOCs	bromoethene		8.57E-04	I	1.12E-01	H												
75-25-2	VOCs	bromoform	TTHM NOTES			3.85E-03	I	2.00E-02	I	7.90E-03	I		1.60E+03	1.30E+02	3.60E-01	2.30E-02		7.00E+04	1.70E+04
74-83-9	VOCs	bromomethane		1.43E-03	I			1.40E-03	I				1.10E+02		5.00E-02	3.30E-03		4.90E+03	
2104-96-3	Pesticides	bromophos						5.00E-03	H				4.00E+02					1.80E+04	
1689-84-5	Herbicides	bromoxynil						2.00E-02	I				1.60E+03					7.00E+04	
1689-99-2	Pesticides	bromoxynil octanoate						2.00E-02	I				1.60E+03					7.00E+04	
106-99-0	VOCs	butadiene;1,3-		5.71E-04	I	1.05E-01	I			6.00E-01	C			1.70E+00					2.20E+02
71-36-3	VOCs	butanol;n-						1.00E-01	I				8.00E+03		3.30E+00	2.30E-01		3.50E+05	
85-68-7	Phthalates	butyl benzyl phthalate						2.00E-01	I	1.90E-03	P		1.60E+04	5.30E+02	1.30E+01	6.50E-01		7.00E+05	6.90E+04
2008-41-5	Pesticides	butylate						5.00E-02	I				4.00E+03					1.80E+05	
85-70-1	Phthalates	butylphthalyl butylglycolate						1.00E+00	I				8.00E+04					3.50E+06	
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-						1.00E-02	I				8.00E+02					3.50E+04	
75-60-5	Pesticides	cacodylic acid						2.00E-02	A				1.60E+03					7.00E+04	
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES	2.86E-06	A	6.30E+00	I	5.00E-04	I										
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES	2.86E-06	A	6.30E+00	I	1.00E-03	I			2.00E+00	8.00E+01		6.90E-01	3.50E-02	2.00E+00	3.50E+03	
592-01-8	Cyanides	calcium cyanide						1.00E-03	I				8.00E+01					3.50E+03	
105-60-2	SVOCs	caprolactam		6.29E-04	C			5.00E-01	I				4.00E+04					1.80E+06	
2425-06-1	Pesticides	captafol				1.51E-01	C	2.00E-03	I	1.50E-01	C		1.60E+02	6.70E+00				7.00E+03	8.80E+02
133-06-2	Pesticides	captan				2.31E-03	C	1.30E-01	I	2.30E-03	C		1.00E+04	4.30E+02				4.60E+05	5.70E+04

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	RfDi Inhalation Reference Dose (mg/kg-day)	Source	CPFi Inhalation Cancer Potency Factor (kg-day/mg)	Source	RfDo Oral Reference Dose (mg/kg-day)	Source	CPFo Oral Cancer Potency Factor (kg-day/mg)	Source	Soil Method A Unrestricted Land Use (mg/kg)	Soil Method B Non cancer (mg/kg)	Soil Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	Soil Protective of Groundwater Saturated see guidance (mg/kg)	Soil Method A Industrial Properties (mg/kg)	Soil Method C Non cancer (mg/kg)	Soil Method C Cancer (mg/kg)
63-25-2	Pesticides (Carbamate)	carbaryl						1.00E-01	I				8.00E+03					3.50E+05	
86-74-8	PAHs	carbazole																	
1563-66-2	Pesticides (Carbamate)	carbofuran						5.00E-03	I				4.00E+02					1.80E+04	
75-15-0	VOCs	carbon disulfide		2.00E-01	I			1.00E-01	I				8.00E+03		5.00E+00	2.70E-01		3.50E+05	
56-23-5	VOCs	carbon tetrachloride		2.86E-02	I	2.10E-02	I	4.00E-03	I	7.00E-02	I		3.20E+02	1.40E+01	4.20E-02	2.20E-03		1.40E+04	1.90E+03
786-19-6	Pesticides	carbophenothion																	
55285-14-8	Pesticides	carbosulfan						1.00E-02	I				8.00E+02					3.50E+04	
5234-68-4	Pesticides	carboxin						1.00E-01	I				8.00E+03					3.50E+05	
1306-38-3	Metals	cerium oxide and cerium compounds		2.60E-04	I														
75-87-6	VOCs	chloral																	
302-17-0	VOCs	chloral hydrate						1.00E-01	I				8.00E+03					3.50E+05	
133-90-4	Herbicides	chloramben						1.50E-02	I				1.20E+03					5.30E+04	
118-75-2	Pesticides	chloranil								4.00E-01	H			2.50E+00					3.30E+02
12789-03-6	Pesticides	chlordane		2.00E-04	I	3.50E-01	I	5.00E-04	I	3.50E-01	I		4.00E+01	2.90E+00	2.10E+00	1.00E-01		1.80E+03	3.80E+02
143-50-0	SVOCs	chlordecone (kepone)				1.61E+01	C	3.00E-04	I	1.00E+01	I		2.40E+01	1.00E-01				1.10E+03	1.30E+01
16887-00-6	Nutrients	chloride																	
90982-32-4	Pesticides	chlorimuron-ethyl						2.00E-02	I				1.60E+03					7.00E+04	
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS	4.29E-05	A			1.00E-01	I				8.00E+03					3.50E+05	
506-77-4	Cyanides	chlorine cyanide						5.00E-02	I				4.00E+03					1.80E+05	
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS	5.71E-05	I			3.00E-02	I				2.40E+03					1.10E+05	
7758-19-2	Nutrients	chlorite						3.00E-02	I				2.40E+03					1.10E+05	
75-68-3	VOCs	chloro-1,1-difluoroethane;1-		1.43E+01	I														
126-99-8	VOCs	chloro-1,3-butadiene;2-		5.71E-03	I	1.05E+00	I	2.00E-02	H				1.60E+03					7.00E+04	
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-								4.60E-01	H			2.20E+00					2.90E+02
95-69-2	SVOCs	chloro-2-methylaniline;4-				2.70E-01	C	3.00E-03	X	1.00E-01	P		2.40E+02	1.00E+01				1.10E+04	1.30E+03
79-11-8	SVOCs	chloroacetic acid						2.00E-03	H				1.60E+02					7.00E+03	
532-27-4	SVOCs	chloroacetophenone;2-		8.57E-06	I														
106-47-8	SVOCs	chloroaniline;p-						4.00E-03	I	2.00E-01	P		3.20E+02	5.00E+00	1.20E-03	7.70E-05		1.40E+04	6.60E+02
108-90-7	VOCs	chlorobenzene		1.43E-02	P			2.00E-02	I				1.60E+03		8.60E-01	5.10E-02		7.00E+04	
510-15-6	Pesticides	chlorobenzilate				1.09E-01	C	2.00E-02	I	1.10E-01	C		1.60E+03	9.10E+00				7.00E+04	1.20E+03
74-11-3	Pesticides	chlorobenzoic acid;p-						3.00E-02	X				2.40E+03					1.10E+05	
98-56-6	VOCs	chlorobenzotrifluoride;4-		8.57E-02	P			3.00E-03	P				2.40E+02					1.10E+04	
109-69-3	VOCs	chlorobutane;1-						4.00E-02	P				3.20E+03					1.40E+05	
59-50-7	Phenols	chlorocresol						1.00E-01	A				8.00E+03					3.50E+05	
75-45-6	VOCs	chlorodifluoromethane		1.43E+01	I														
67-66-3	VOCs	chloroform	TTHM NOTES	2.80E-02	A	8.05E-02	I	1.00E-02	I	3.10E-02	C		8.00E+02	3.20E+01	7.40E-02	4.80E-03		3.50E+04	4.20E+03
74-87-3	VOCs	chloromethane		2.57E-02	I														
107-30-2	VOCs	chloromethyl methyl ether				2.42E+00	C			2.40E+00	C			4.20E-01					5.50E+01
88-73-3	Pesticides	chloronitrobenzene;o-		2.86E-06	X			3.00E-03	P	3.00E-01	P		2.40E+02	3.30E+00				1.10E+04	4.40E+02
100-00-5	Pesticides	chloronitrobenzene;p-		5.71E-04	P			7.00E-04	P	6.00E-02	P		5.60E+01	1.70E+01				2.50E+03	2.20E+03
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT					5.00E-03	I				4.00E+02		4.70E-01	2.70E-02		1.80E+04	
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-																	
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-																	
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-																	
75-29-6	VOCs	chloropropane;2-																	
1897-45-6	Pesticides	chlorothalonil				3.12E-03	C	1.50E-02	I	3.10E-03	C		1.20E+03	3.20E+02				5.30E+04	4.20E+04
95-49-8	VOCs	chlorotoluene;o-						2.00E-02	I				1.60E+03					7.00E+04	
101-21-3	Pesticides	chlorpropham						2.00E-01	I				1.60E+04					7.00E+05	
2921-88-2	Pesticides	chlorpyrifos						1.00E-03	A				8.00E+01					3.50E+03	
5598-13-0	Pesticides	chlorpyrifos-methyl						1.00E-02	H				8.00E+02					3.50E+04	
64902-72-3	Herbicides	chlorsulfuron						5.00E-02	I				4.00E+03					1.80E+05	
60238-56-4	Pesticides	chlorthiophos						8.00E-04	H				6.40E+01					2.80E+03	
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES																
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES					1.50E+00	I			2.00E+03	1.20E+05		4.80E+05	2.40E+04	2.00E+03	5.30E+06	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	RfDi Inhalation Reference Dose (mg/kg-day)	Source	CPFi Inhalation Cancer Potency Factor (kg-day/mg)	Source	RfDo Oral Reference Dose (mg/kg-day)	Source	CPFo Oral Cancer Potency Factor (kg-day/mg)	Source	Soil Method A Unrestricted Land Use (mg/kg)	Soil Method B Non cancer (mg/kg)	Soil Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	Soil Protective of Groundwater Saturated see guidance (mg/kg)	Soil Method A Industrial Properties (mg/kg)	Soil Method C Non cancer (mg/kg)	Soil Method C Cancer (mg/kg)
18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES	2.86E-05	I	2.94E+02	S	3.00E-03	I			1.90E+01	2.40E+02		1.80E+01	9.30E-01	1.90E+01	1.10E+04	
218-01-9	cPAHs	CHRYSENE	PAH NOTES			3.85E-02	C												
8001-58-9	PAHs	coal tar creosote																	
8007-45-2	VOCs	coke oven emissions				2.17E+00	I												
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT					4.00E-02	H				3.20E+03		2.80E+02	1.40E+01		1.40E+05	
544-92-3	Cyanides	copper cyanide						5.00E-03	I				4.00E+02					1.80E+04	
108-39-4	Phenols	cresol;m-		1.71E-01	C			5.00E-02	I				4.00E+03					1.80E+05	
95-48-7	Phenols	cresol;o-		1.71E-01	C			5.00E-02	I				4.00E+03		2.30E+00	1.50E-01		1.80E+05	
106-44-5	Phenols	cresol;p-		1.71E-01	C			1.00E-01	A				8.00E+03					3.50E+05	
4170-30-3	VOCs	crotonaldehyde						1.00E-03	P	1.90E+00	H		8.00E+01	5.30E-01				3.50E+03	6.90E+01
98-82-8	VOCs	cumene		1.14E-01	I			1.00E-01	I				8.00E+03					3.50E+05	
21725-46-2	Pesticides	cyanazine						2.00E-03	H	8.40E-01	H		1.60E+02	1.20E+00				7.00E+03	1.60E+02
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES	2.29E-04	S			6.30E-04	I				5.00E+01					2.20E+03	
460-19-5	Cyanides	cyanogen						1.00E-03	I				8.00E+01					3.50E+03	
506-68-3	Cyanides	cyanogen bromide						9.00E-02	I				7.20E+03					3.20E+05	
110-82-7	VOCs	cyclohexane		1.71E+00	I														
108-94-1	VOCs	cyclohexanone		2.00E-01	P			5.00E+00	I				4.00E+05					1.80E+07	
108-91-8	SVOCs	cyclohexylamine						2.00E-01	I				1.60E+04					7.00E+05	
542-92-7	SVOCs	cyclopentadiene																	
68085-85-8	Pesticides	cyhalothrin/karate						5.00E-03	I				4.00E+02					1.80E+04	
52315-07-8	Pesticides	cypermethrin						1.00E-02	I				8.00E+02					3.50E+04	
66215-27-8	Pesticides	cyromazine						7.50E-03	I				6.00E+02					2.60E+04	
1861-32-1	Herbicides	dacthal						1.00E-02	I				8.00E+02					3.50E+04	
75-99-0	Herbicides	dalapon, sodium salt						3.00E-02	I				2.40E+03					1.10E+05	
39515-41-8	Pesticides	danitol						2.50E-02	I				2.00E+03					8.80E+04	
94-82-6	Herbicides	db;2,4-						8.00E-03	I				6.40E+02					2.80E+04	
72-54-8	Pesticides	ddd				2.42E-01	C	3.00E-05	X	2.40E-01	I		2.40E+00	4.20E+00	3.40E-01	1.70E-02		1.10E+02	5.50E+02
72-55-9	Pesticides	dde				3.40E-01	C	3.00E-04	X	3.40E-01	I		2.40E+01	2.90E+00	4.50E-01	2.20E-02		1.10E+03	3.90E+02
50-29-3	Pesticides	ddt				3.40E-01	I	5.00E-04	I	3.40E-01	I	3.00E+00	4.00E+01	2.90E+00	3.50E+00	1.70E-01	4.00E+00	1.80E+03	3.90E+02
1163-19-5	PBDEs	decabromodiphenyl ether						7.00E-03	I	7.00E-04	I		5.60E+02	1.40E+03				2.50E+04	1.90E+05
8065-48-3	Pesticides	demeton						4.00E-05	I				3.20E+00					1.40E+02	
103-23-1	Phthalates	di(2-ethylhexyl)adipate						6.00E-01	I	1.20E-03	I		4.80E+04	8.30E+02				2.10E+06	1.10E+05
2303-16-4	Pesticides	diallate								6.10E-02	H			1.60E+01					2.20E+03
333-41-5	Pesticides	diazinon						7.00E-04	A				5.60E+01					2.50E+03	
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES			4.20E+00	C												
132-64-9	PAHs	dibenzofuran						1.00E-03	X				8.00E+01					3.50E+03	
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-		5.71E-05	I	2.10E+01	P	2.00E-04	P	8.00E-01	P		1.60E+01	1.30E+00				7.00E+02	1.60E+02
631-64-1	SVOCs	dibromoacetic acid																	
106-37-6	Pesticides	dibromobenzene;1,4-						1.00E-02	I				8.00E+02					3.50E+04	
124-48-1	VOCs	dibromochloromethane	TTHM NOTES					2.00E-02	I	8.40E-02	I		1.60E+03	1.20E+01	2.80E-02	1.80E-03		7.00E+04	1.60E+03
84-74-2	Phthalates	di-butyl phthalate						1.00E-01	I				8.00E+03		5.70E+01	3.00E+00		3.50E+05	
1918-00-9	Herbicides	dicamba						3.00E-02	I				2.40E+03					1.10E+05	
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS																
764-41-0	VOCs	dichloro-2-butene;1,4-				1.47E+01	P												
79-43-6	SVOCs	dichloroacetic acid						4.00E-03	I	5.00E-02	I		3.20E+02	2.00E+01				1.40E+04	2.60E+03
95-50-1	VOCs	dichlorobenzene;1,2-		5.71E-02	H			9.00E-02	I				7.20E+03		7.00E+00	4.00E-01		3.20E+05	
541-73-1	VOCs	dichlorobenzene;1,3-																	
106-46-7	VOCs	dichlorobenzene;1,4-		2.29E-01	I	3.85E-02	C	7.00E-02	A	5.40E-03	C		5.60E+03	1.90E+02	1.20E+00	6.80E-02		2.50E+05	2.40E+04
91-94-1	SVOCs	dichlorobenzidine;3,3'-				1.19E+00	C			4.50E-01	I			2.20E+00	3.60E-03	2.00E-04			2.90E+02
75-71-8	VOCs	dichlorodifluoromethane		2.86E-02	X			2.00E-01	I				1.60E+04					7.00E+05	
75-34-3	VOCs	dichloroethane;1,1-				5.60E-03	C	2.00E-01	P	5.70E-03	C		1.60E+04	1.80E+02	4.10E-02	2.60E-03		7.00E+05	2.30E+04
107-06-2	VOCs	dichloroethane;1,2-		2.00E-03	P	9.10E-02	I	6.00E-03	X	9.10E-02	I		4.80E+02	1.10E+01	2.30E-02	1.60E-03		2.10E+04	1.40E+03
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)						9.00E-03	H				7.20E+02					3.20E+04	
75-35-4	VOCs	dichloroethylene;1,1-		5.71E-02	I			5.00E-02	I				4.00E+03		4.60E-02	2.50E-03		1.80E+05	
156-59-2	VOCs	dichloroethylene;1,2-,cis						2.00E-03	I				1.60E+02		7.80E-02	5.20E-03		7.00E+03	
156-60-5	VOCs	dichloroethylene;1,2-,trans						2.00E-02	I				1.60E+03		5.20E-01	3.20E-02		7.00E+04	
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT					3.00E-03	I				2.40E+02		1.70E-01	1.00E-02		1.10E+04	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-						1.00E-02	I				8.00E+02					3.50E+04	
78-87-5	VOCs	dichloropropane;1,2-		1.14E-03	I	1.30E-02	P	4.00E-02	P	3.70E-02	P		3.20E+03	2.70E+01	2.50E-02	1.70E-03		1.40E+05	3.50E+03
616-23-9	SVOCs	dichloropropanol;2,3-						3.00E-03	I				2.40E+02					1.10E+04	
542-75-6	VOCs	dichloropropene;1,3-		5.71E-03	I	1.40E-02	I	3.00E-02	I	1.00E-01	I		2.40E+03	1.00E+01	2.30E-03	1.40E-04		1.10E+05	1.30E+03
62-73-7	Pesticides	dichlorvos		1.43E-04	I	2.91E-01	C	5.00E-04	I	2.90E-01	I		4.00E+01	3.40E+00				1.80E+03	4.50E+02
115-32-2	Pesticides	dicofol																	
77-73-6	VOCs	dicyclopentadiene		8.57E-05	X			8.00E-02	P				6.40E+03					2.80E+05	
60-57-1	Pesticides	dieldrin				1.61E+01	I	5.00E-05	I	1.60E+01	I		4.00E+00	6.30E-02	2.80E-03	1.40E-04		1.80E+02	8.20E+00
84-66-2	Phthalates	diethyl phthalate						8.00E-01	I				6.40E+04		7.20E+01	4.70E+00		2.80E+06	
111-46-6	Glycols	diethylene glycol																	
693-21-0	Glycols	diethylene glycol dinitrate																	
112-34-5	Glycols	diethylene glycol monobutyl ether		2.86E-05	P			3.00E-02	P				2.40E+03					1.10E+05	
111-90-0	Glycols	diethylene glycol monoethyl ether		8.57E-05	P			6.00E-02	P				4.80E+03					2.10E+05	
617-84-5	SVOCs	diethylformamide						1.00E-03	P				8.00E+01					3.50E+03	
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate																	
56-53-1	SVOCs	diethylstilbesterol				3.50E+02	C			3.50E+02	C			2.90E-03					3.80E-01
43222-48-6	Pesticides	difenzoquat						8.00E-02	I				6.40E+03					2.80E+05	
35367-38-5	Pesticides	diflubenzuron						2.00E-02	I				1.60E+03					7.00E+04	
75-37-6	VOCs	difluoroethane;1,1-		1.14E+01	I														
1445-75-6	SVOCs	diisopropyl methylphosphonate						8.00E-02	I				6.40E+03					2.80E+05	
55290-64-7	Pesticides	dimethipin						2.00E-02	I				1.60E+03					7.00E+04	
60-51-5	Pesticides	dimethoate						2.00E-04	I				1.60E+01					7.00E+02	
119-90-4	SVOCs	dimethoxybenzidine;3,3'-								1.60E+00	P			6.30E-01					8.20E+01
131-11-3	Phthalates	dimethyl phthalate																	
120-61-6	Phthalates	dimethyl terephthalate						1.00E-01	I				8.00E+03					3.50E+05	
124-40-3	VOCs	dimethylamine																	
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-								5.80E-01	H			1.70E+00					2.30E+02
95-68-1	SVOCs	dimethylaniline;2,4-						2.00E-03	X	2.00E-01	P		1.60E+02	5.00E+00				7.00E+03	6.60E+02
121-69-7	SVOCs	dimethylaniline;N,N-						2.00E-03	I	2.70E-02	P		1.60E+02	3.70E+01				7.00E+03	4.90E+03
119-93-7	SVOCs	dimethylbenzidine;3,3'-								1.10E+01	P			9.10E-02					1.20E+01
68-12-2	VOCs	dimethylformamide;N,N-		8.57E-03	I			1.00E-01	P				8.00E+03					3.50E+05	
57-14-7	VOCs	dimethylhydrazine;1,1-		5.71E-07	X			1.00E-04	X				8.00E+00					3.50E+02	
540-73-8	VOCs	dimethylhydrazine;1,2-				5.60E+02	C			5.50E+02	C			1.80E-03					2.40E-01
105-67-9	Phenols	dimethylphenol;2,4-						2.00E-02	I				1.60E+03		1.30E+00	7.90E-02		7.00E+04	
576-26-1	Phenols	dimethylphenol;2,6-						6.00E-04	I				4.80E+01					2.10E+03	
95-65-8	Phenols	dimethylphenol;3,4-						1.00E-03	I				8.00E+01					3.50E+03	
99-65-0	Explosives	dinitrobenzene;m-						1.00E-04	I				8.00E+00					3.50E+02	
528-29-0	SVOCs	dinitrobenzene;o-						1.00E-04	P				8.00E+00					3.50E+02	
100-25-4	SVOCs	dinitrobenzene;p-						1.00E-04	P				8.00E+00					3.50E+02	
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-						2.00E-03	I				1.60E+02					7.00E+03	
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT					2.00E-03	I				1.60E+02		1.30E-01	9.20E-03		7.00E+03	
25550-58-7	Phenols	dinitrophenols																	
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-						9.00E-04	X	6.80E-01	I		7.20E+01	1.50E+00				3.20E+03	1.90E+02
121-14-2	Explosives	dinitrotoluene;2,4-				3.12E-01	C	2.00E-03	I	3.10E-01	C		1.60E+02	3.20E+00	1.70E-03	1.10E-04		7.00E+03	4.20E+02
606-20-2	Explosives	dinitrotoluene;2,6-						3.00E-04	X	1.50E+00	P		2.40E+01	6.70E-01	3.10E-04	2.10E-05		1.10E+03	8.80E+01
117-84-0	Phthalates	di-n-octyl phthalate						1.00E-02	P				8.00E+02		2.70E+05	1.30E+04		3.50E+04	
88-85-7	Herbicides	dinoseb						1.00E-03	I				8.00E+01					3.50E+03	
123-91-1	VOCs	dioxane;1,4-		8.57E-03	I	1.75E-02	I	3.00E-02	I	1.00E-01	I		2.40E+03	1.00E+01				1.10E+05	1.30E+03
957-51-7	Pesticides	diphenamid						3.00E-02	I				2.40E+03					1.10E+05	
122-39-4	SVOCs	diphenylamine						2.50E-02	I				2.00E+03					8.80E+04	
122-66-7	SVOCs	diphenylhydrazine;1,2-				7.70E-01	I			8.00E-01	I			1.30E+00					1.60E+02
85-00-7	Pesticides	diquat						2.20E-03	I				1.80E+02					7.70E+03	
1937-37-7	Dyes	direct black 38				4.90E+02	C			7.10E+00	C			1.40E-01					1.80E+01
2602-46-2	Dyes	direct blue 6				4.90E+02	C			7.40E+00	C			1.40E-01					1.80E+01

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
16071-86-6	Dyes	direct brown 95				4.90E+02	C			6.70E+00	C			1.50E-01					2.00E+01
2610-05-1	Dyes	direct sky blue																	
298-04-4	Pesticides	disulfoton						4.00E-05	I				3.20E+00					1.40E+02	
505-29-3	SVOCs	dithiane;1,4-						1.00E-02	I				8.00E+02					3.50E+04	
330-54-1	Pesticides (Carbamate)	diuron						2.00E-03	I				1.60E+02					7.00E+03	
534-52-1	Phenols	DNOC						8.00E-05	X				6.40E+00					2.80E+02	
2439-10-3	Pesticides	dodine						4.00E-03	I				3.20E+02					1.40E+04	
115-29-7	Pesticides	endosulfan						6.00E-03	I				4.80E+02		4.30E+00	2.20E-01		2.10E+04	
1031-07-8	Pesticides	endosulfan sulfate						6.00E-03	P				4.80E+02					2.10E+04	
959-98-8	Pesticides	endosulfan;alpha																	
33213-65-9	Pesticides	endosulfan;beta																	
145-73-3	Herbicides	endothall						2.00E-02	I				1.60E+03					7.00E+04	
72-20-8	Pesticides	endrin						3.00E-04	I				2.40E+01		4.40E-01	2.20E-02		1.10E+03	
7421-93-4	Pesticides	endrin aldehyde																	
106-89-8	VOCs	epichlorohydrin		2.86E-04	I	4.20E-03	I	6.00E-03	P	9.90E-03	I		4.80E+02	1.00E+02				2.10E+04	1.30E+04
106-88-7	VOCs	epoxybutane		5.71E-03	I														
16672-87-0	Pesticides	ethephon						5.00E-03	I				4.00E+02					1.80E+04	
563-12-2	Pesticides	ethion						5.00E-04	I				4.00E+01					1.80E+03	
111-15-9	VOCs	ethoxyethanol acetate;2-		1.71E-02	P			1.00E-01	P				8.00E+03					3.50E+05	
110-80-5	VOCs	ethoxyethanol;2-		5.71E-02	I			9.00E-02	P				7.20E+03					3.20E+05	
141-78-6	VOCs	ethyl acetate		2.00E-02	P			9.00E-01	I				7.20E+04					3.20E+06	
140-88-5	VOCs	ethyl acrylate		2.30E-03	P			5.00E-03	P	4.80E-02	H		4.00E+02	2.10E+01				1.80E+04	2.70E+03
75-00-3	VOCs	ethyl chloride		2.86E+00	I														
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-						2.50E-02	I				2.00E+03					8.80E+04	
60-29-7	VOCs	ethyl ether						2.00E-01	I				1.60E+04					7.00E+05	
97-63-2	VOCs	ethyl methacrylate		8.57E-02	P			9.00E-02	H				7.20E+03					3.20E+05	
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate						1.00E-05	I				8.00E-01					3.50E+01	
100-41-4	VOCs	ethylbenzene		2.86E-01	I			1.00E-01	I			6.00E+00	8.00E+03		5.90E+00	3.40E-01	6.00E+00	3.50E+05	
109-78-4	SVOCs	ethylene cyanohydrin						7.00E-02	P				5.60E+03					2.50E+05	
107-15-3	SVOCs	ethylene diamine						9.00E-02	P				7.20E+03					3.20E+05	
106-93-4	VOCs	ethylene dibromide (EDB)		2.57E-03	I	2.10E+00	I	9.00E-03	I	2.00E+00	I	5.00E-03	7.20E+02	5.00E-01			5.00E-03	3.20E+04	6.60E+01
107-21-1	VOCs	ethylene glycol		1.14E-01	C			2.00E+00	I				1.60E+05					7.00E+06	
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)		4.57E-01	I			1.00E-01	I				8.00E+03					3.50E+05	
75-21-8	VOCs	ethylene oxide		8.57E-03	C	1.05E+01	I			3.10E-01	C			3.20E+00					4.20E+02
96-45-7	SVOCs	ethylene thiourea				4.55E-02	C	8.00E-05	I	4.50E-02	C		6.40E+00	2.20E+01				2.80E+02	2.90E+03
84-72-0	Phthalates	ethylphthalyl ethylglycolate						3.00E+00	I				2.40E+05					1.10E+07	
101200-48-0	Pesticides	express						8.00E-03	I				6.40E+02					2.80E+04	
22224-92-6	Pesticides	fenamiphos						2.50E-04	I				2.00E+01					8.80E+02	
115-90-2	Pesticides	fensulfothion																	
2164-17-2	Pesticides	fluometuron						1.30E-02	I				1.00E+03					4.60E+04	
206-44-0	PAHs	fluoranthene						4.00E-02	I				3.20E+03		6.30E+02	3.20E+01		1.40E+05	
86-73-7	PAHs	fluorene						4.00E-02	I				3.20E+03		1.00E+02	5.10E+00		1.40E+05	
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES	3.71E-03	C			6.00E-02	I				4.80E+03					2.10E+05	
59756-60-4	Pesticides	fluridone						8.00E-02	I				6.40E+03					2.80E+05	
56425-91-3	Pesticides	flurprimidol						2.00E-02	I				1.60E+03					7.00E+04	
66332-96-5	Pesticides	flutolanil						6.00E-02	I				4.80E+03					2.10E+05	
69409-94-5	Pesticides	fluvalinate						1.00E-02	I				8.00E+02					3.50E+04	
133-07-3	Pesticides	folpet						1.00E-01	I	3.50E-03	I		8.00E+03	2.90E+02				3.50E+05	3.80E+04
72178-02-0	Pesticides	fomesafen								1.90E-01	I			5.30E+00					6.90E+02
944-22-9	Pesticides	fonofos						2.00E-03	I				1.60E+02					7.00E+03	
50-00-0	VOCs	formaldehyde		2.80E-03	A	4.55E-02	I	2.00E-01	I	2.10E-02	C		1.60E+04	4.80E+01				7.00E+05	6.30E+03
64-18-6	VOCs	formic acid		8.57E-05	X			9.00E-01	P				7.20E+04					3.20E+06	
39148-24-8	Pesticides	fosetyl-al						3.00E+00	I				2.40E+05					1.10E+07	
110-00-9	Furans	furan						1.00E-03	I				8.00E+01					3.50E+03	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	RfDi Inhalation Reference Dose (mg/kg-day)	Source	CPFi Inhalation Cancer Potency Factor (kg-day/mg)	Source	RfDo Oral Reference Dose (mg/kg-day)	Source	CPFo Oral Cancer Potency Factor (kg-day/mg)	Source	Soil Method A Unrestricted Land Use (mg/kg)	Soil Method B Non cancer (mg/kg)	Soil Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	Soil Protective of Groundwater Saturated see guidance (mg/kg)	Soil Method A Industrial Properties (mg/kg)	Soil Method C Non cancer (mg/kg)	Soil Method C Cancer (mg/kg)
67-45-8	SVOCs	furazolidone								3.80E+00	H			2.60E-01					3.50E+01
98-01-1	VOCs	furfural		1.43E-02	H			3.00E-03	I				2.40E+02					1.10E+04	
531-82-8	SVOCs	furium				1.51E+00	C			1.50E+00	C			6.70E-01					8.80E+01
60568-05-0	Pesticides	furmecyclox				3.01E-02	C			3.00E-02	I			3.30E+01					4.40E+03
77182-82-2	SVOCs	glufosinate-ammonium						4.00E-04	I				3.20E+01					1.40E+03	
765-34-4	VOCs	glycidaldehyde		2.86E-04	H			4.00E-04	I				3.20E+01					1.40E+03	
1071-83-6	SVOCs	glyphosate						1.00E-01	I				8.00E+03					3.50E+05	
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE																
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE																
86-50-0	Pesticides	guthion		2.86E-03	A			3.00E-03	A				2.40E+02					1.10E+04	
69806-40-2	Pesticides	haloxyfop-methyl						5.00E-05	I				4.00E+00					1.80E+02	
79277-27-3	Pesticides	harmony						1.30E-02	I				1.00E+03					4.60E+04	
76-44-8	Pesticides	heptachlor				4.55E+00	I	5.00E-04	I	4.50E+00	I		4.00E+01	2.20E-01	3.80E-02	1.90E-03		1.80E+03	2.90E+01
1024-57-3	Pesticides	heptachlor epoxide				9.10E+00	I	1.30E-05	I	9.10E+00	I		1.00E+00	1.10E-01	8.00E-02	4.00E-03		4.60E+01	1.40E+01
142-82-5	VOCs	heptane;n-		1.10E-01	P			3.00E-04	X				2.40E+01					1.10E+03	
87-82-1	SVOCs	hexabromobenzene						2.00E-03	I				1.60E+02					7.00E+03	
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-						2.00E-04	I				1.60E+01					7.00E+02	
118-74-1	Pesticides	hexachlorobenzene				1.61E+00	I	8.00E-04	I	1.60E+00	I		6.40E+01	6.30E-01	8.80E-01	4.40E-02		2.80E+03	8.20E+01
87-68-3	VOCs	hexachlorobutadiene				7.70E-02	I	1.00E-03	P	7.80E-02	I		8.00E+01	1.30E+01	6.00E-01	3.00E-02		3.50E+03	1.70E+03
319-84-6	Pesticides	hexachlorocyclohexane;alpha				6.30E+00	I	8.00E-03	A	6.30E+00	I		6.40E+02	1.60E-01	5.50E-04	2.80E-05		2.80E+04	2.10E+01
319-85-7	Pesticides	hexachlorocyclohexane;beta-				1.86E+00	I			1.80E+00	I			5.60E-01	2.30E-03	1.20E-04			7.30E+01
319-86-8	Pesticides	hexachlorocyclohexane;delta-																	
608-73-1	SVOCs	hexachlorocyclohexane;technical				1.79E+00	I			1.80E+00	I			5.60E-01					7.30E+01
77-47-4	Pesticides	hexachlorocyclopentadiene		5.71E-05	I			6.00E-03	I				4.80E+02		1.90E+02	9.60E+00		2.10E+04	
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture				4.55E+03	I			6.20E+03	I			1.60E-04					2.10E-02
67-72-1	VOCs	hexachloroethane		8.57E-03	I	3.85E-02	C	7.00E-04	I	4.00E-02	I		5.60E+01	2.50E+01	4.30E-02	2.30E-03		2.50E+03	3.30E+03
70-30-4	SVOCs	hexachlorophene						3.00E-04	I				2.40E+01					1.10E+03	
822-06-0	VOCs	hexamethylene diisocyanate;1,6-		2.86E-06	I														
110-54-3	VOCs	hexane;n-		2.00E-01	I			6.00E-02	H				4.80E+03		6.90E+01	1.80E+00		2.10E+05	
591-78-6	VOCs	hexanone;2-		8.60E-03	I			5.00E-03	I				4.00E+02					1.80E+04	
51235-04-2	Pesticides	hexazinone						3.30E-02	I				2.60E+03					1.20E+05	
302-01-2	VOCs	hydrazine		8.57E-06	P	1.72E+01	I			3.00E+00	I			3.30E-01					4.40E+01
10034-93-2	SVOCs	hydrazine sulfate				1.72E+01	I			3.00E+00	I			3.30E-01					4.40E+01
7647-01-0	VOCs	hydrogen chloride		5.71E-03	I														
74-90-8	Cyanides	hydrogen cyanide		2.29E-04	I			6.00E-04	I				4.80E+01					2.10E+03	
7783-06-4	VOCs	hydrogen sulfide		5.71E-04	I														
123-31-9	SVOCs	hydroquinone						4.00E-02	P	6.00E-02	P		3.20E+03	1.70E+01				1.40E+05	2.20E+03
35554-44-0	Pesticides	imazalil						1.30E-02	I				1.00E+03					4.60E+04	
81335-37-7	Pesticides	imazaquin						2.50E-01	I				2.00E+04					8.80E+05	
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES			3.85E-01	C												
36734-19-7	Pesticides	iprodione						4.00E-02	I				3.20E+03					1.40E+05	
7439-89-6	Metals	iron						7.00E-01	P				5.60E+04					2.50E+06	
78-83-1	VOCs	isobutyl alcohol						3.00E-01	I				2.40E+04					1.10E+06	
78-59-1	SVOCs	isophorone		5.71E-01	C			2.00E-01	I	9.50E-04	I		1.60E+04	1.10E+03	2.30E-01	1.50E-02		7.00E+05	1.40E+05
33820-53-0	Pesticides	isopropalin						1.50E-02	I				1.20E+03					5.30E+04	
1832-54-8	SVOCs	isopropyl methyl phosphonic acid						1.00E-01	I				8.00E+03					3.50E+05	
82558-50-7	Pesticides	isoxaben						5.00E-02	I				4.00E+03					1.80E+05	
77501-63-4	Pesticides	lactofen						2.00E-03	I				1.60E+02					7.00E+03	
7439-92-1	Metals	LEAD	LEAD NOTES									2.50E+02			3.00E+03	1.50E+02	1.00E+03		
unavailable02	Metals	lead alkyls																	
58-89-9	Pesticides	lindane				1.09E+00	C	3.00E-04	I	1.10E+00	C	1.00E-02	2.40E+01	9.10E-01	6.20E-03	3.30E-04	1.00E-02	1.10E+03	1.20E+02
330-55-2	Pesticides (Carbamate)	linuron						2.00E-03	I				1.60E+02					7.00E+03	
7791-03-9	Perchlorates	lithium perchlorate						7.00E-04	I				5.60E+01					2.50E+03	
83055-99-6	Pesticides	londax						2.00E-01	I				1.60E+04					7.00E+05	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
121-75-5	Pesticides	malathion						2.00E-02	I				1.60E+03					7.00E+04	
108-31-6	SVOCs	maleic anhydride		2.00E-04	C			1.00E-01	I				8.00E+03					3.50E+05	
123-33-1	SVOCs	maleic hydrazide						5.00E-01	I				4.00E+04					1.80E+06	
109-77-3	VOCs	malononitrile						1.00E-04	P				8.00E+00					3.50E+02	
8018-01-7	Pesticides	mancozeb						3.00E-02	H				2.40E+03					1.10E+05	
12427-38-2	Pesticides	maneb						5.00E-03	I				4.00E+02					1.80E+04	
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES	1.43E-05	I			1.40E-01	I										
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES	1.43E-05	I			4.67E-02	I				3.70E+03					1.60E+05	
950-10-7	Pesticides	mephosfolan						9.00E-05	H				7.20E+00					3.20E+02	
24307-26-4	Pesticides	mepiquat chloride						3.00E-02	I				2.40E+03					1.10E+05	
7487-94-7	Metals	mercuric chloride		8.57E-05	S			3.00E-04	I				2.40E+01					1.10E+03	
7439-97-6	Metals	mercury		8.57E-05	I							2.00E+00			2.10E+00	1.00E-01	2.00E+00		
150-50-5	Pesticides	merphos						3.00E-05	I				2.40E+00					1.10E+02	
57837-19-1	Pesticides	metalaxyl						6.00E-02	I				4.80E+03					2.10E+05	
126-98-7	VOCs	methacrylonitrile		8.57E-03	P			1.00E-04	I				8.00E+00					3.50E+02	
10265-92-6	Pesticides	methamidosphos						5.00E-05	I				4.00E+00					1.80E+02	
67-56-1	VOCs	methanol		5.71E+00	I			2.00E+00	I				1.60E+05					7.00E+06	
950-37-8	Pesticides	methidathion						1.00E-03	I				8.00E+01					3.50E+03	
16752-77-5	Pesticides (Carbamate)	methomyl						2.50E-02	I				2.00E+03					8.80E+04	
99-59-2	SVOCs	methoxy-5-nitroaniline;2-				4.90E-02	C			4.90E-02	C			2.00E+01					2.70E+03
72-43-5	Pesticides	methoxychlor						5.00E-03	I				4.00E+02		6.40E+01	3.20E+00		1.80E+04	
110-49-6	VOCs	methoxyethanol acetate;2-		2.86E-04	P			8.00E-03	P				6.40E+02					2.80E+04	
109-86-4	VOCs	methoxyethanol;2-		5.71E-03	I			5.00E-03	P				4.00E+02					1.80E+04	
79-20-9	VOCs	methyl acetate						1.00E+00	X				8.00E+04					3.50E+06	
96-33-3	VOCs	methyl acrylate		5.71E-03	P			3.00E-02	H				2.40E+03					1.10E+05	
78-93-3	VOCs	methyl ethyl ketone		1.43E+00	I			6.00E-01	I				4.80E+04					2.10E+06	
108-10-1	VOCs	methyl isobutyl ketone		8.57E-01	I			8.00E-02	H				6.40E+03					2.80E+05	
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES					1.00E-04	I				8.00E+00					3.50E+02	
80-62-6	VOCs	methyl methacrylate		2.00E-01	I			1.40E+00	I				1.10E+05					4.90E+06	
90-12-0	PAHs	methyl naphthalene;1-						7.00E-02	A	2.90E-02	P		5.60E+03	3.40E+01				2.50E+05	4.50E+03
91-57-6	PAHs	methyl naphthalene;2-						4.00E-03	I				3.20E+02					1.40E+04	
298-00-0	Pesticides	methyl parathion						2.50E-04	I				2.00E+01					8.80E+02	
25013-15-4	VOCs	methyl styrene		1.14E-02	H			6.00E-03	H				4.80E+02					2.10E+04	
98-83-9	SVOCs	methyl styrene, alpha						7.00E-02	H				5.60E+03					2.50E+05	
1634-04-4	VOCs	methyl tert-butyl ether		8.57E-01	I	9.10E-04	C			1.80E-03	C	1.00E-01		5.60E+02	1.00E-01	7.20E-03	1.00E-01		7.30E+04
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-						5.00E-04	I				4.00E+01					1.80E+03	
99-55-8	SVOCs	methyl-5-nitroaniline;2-						2.00E-02	X	9.00E-03	P		1.60E+03	1.10E+02				7.00E+04	1.50E+04
636-21-5	SVOCs	methylaniline hydrochloride;2-				1.30E-01	C			1.30E-01	C			7.70E+00					1.00E+03
95-53-4	VOCs	methylaniline;2-				1.79E-01	C			1.60E-02	P			6.30E+01					8.20E+03
108-87-2	VOCs	methylcyclohexane																	
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-				1.51E+00	C	2.00E-03	P	1.00E-01	P		1.60E+02	1.00E+01				7.00E+03	1.30E+03
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-				4.55E-02	C			4.60E-02	I			2.20E+01					2.90E+03
74-95-3	VOCs	methylene bromide		1.14E-03	X			1.00E-02	H				8.00E+02					3.50E+04	
75-09-2	VOCs	methylene chloride		1.71E-01	I	3.50E-05	I	6.00E-03	I	2.00E-03	I	2.00E-02	4.80E+02	5.00E+02	2.10E-02	1.50E-03	2.00E-02	2.10E+04	6.60E+04
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)		1.71E-04	I														
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)		1.71E-04	I														
101-77-9	SVOCs	methylenebisbenzenamine;4,4-		5.71E-03	C	1.61E+00	C			1.60E+00	C			6.30E-01					8.20E+01
60-34-4	VOCs	methylhydrazine		5.71E-06	X	3.50E+00	X	1.00E-03	P				8.00E+01					3.50E+03	
51218-45-2	Pesticides	metolachlor						1.50E-01	I				1.20E+04					5.30E+05	
21087-64-9	Pesticides	metribuzin						2.50E-02	I				2.00E+03					8.80E+04	
7786-34-7	Pesticides	mevinphos																	
2385-85-5	Pesticides	mirex				1.79E+01	C	2.00E-04	I	1.80E+01	C		1.60E+01	5.60E-02				7.00E+02	7.30E+00
2212-67-1	Pesticides	molinate						2.00E-03	I				1.60E+02					7.00E+03	
7439-98-7	Metals	molybdenum						5.00E-03	I				4.00E+02					1.80E+04	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS					1.00E-01	I				8.00E+03					3.50E+05	
unavailable03	SVOCs	monochlorobutanes (not in HSDB)																	
300-76-5	Pesticides	naled						2.00E-03	I				1.60E+02					7.00E+03	
91-20-3	PAHs	naphthalene		8.57E-04	I	1.19E-01	C	2.00E-02	I			5.00E+00	1.60E+03		4.50E+00	2.40E-01	5.00E+00	7.00E+04	
15299-99-7	Pesticides	napropamide						1.00E-01	I				8.00E+03					3.50E+05	
104-51-8	VOCs	n-butylbenzene						5.00E-02	P				4.00E+03					1.80E+05	
2429-74-5	Dyes	niagara blue 4B																	
unavailable04	Metals	nickel refinery dust		4.00E-06	C	8.40E-01	I	1.10E-02	C				8.80E+02					3.90E+04	
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT	2.57E-05	A	9.10E-01	C	2.00E-02	I				1.60E+03		1.30E+02	6.50E+00		7.00E+04	
12035-72-2	Metals	nickel subsulfide		4.00E-06	C	1.68E+00	I	1.10E-02	C	1.70E+00	C		8.80E+02	5.90E-01				3.90E+04	7.70E+01
14797-55-8	Nutrients	nitrate						1.60E+00	I				1.30E+05					5.60E+06	
10102-43-9	Gases	nitric oxide																	
14797-65-0	Nutrients	nitrite						1.00E-01	I				8.00E+03					3.50E+05	
88-74-4	SVOCs	nitroaniline, 2-		1.43E-05	X			1.00E-02	X				8.00E+02					3.50E+04	
100-01-6	SVOCs	nitroaniline, 4-		1.71E-03	P			4.00E-03	P				3.20E+02					1.40E+04	
98-95-3	Explosives	nitrobenzene		2.57E-03	I	1.40E-01	I	2.00E-03	I				1.60E+02		1.00E-01	6.50E-03		7.00E+03	
67-20-9	SVOCs	nitrofurantoin						7.00E-02	H				5.60E+03					2.50E+05	
59-87-0	SVOCs	nitrofurazone				1.30E+00	C			1.30E+00	C			7.70E-01					1.00E+02
10102-44-0	Gases	nitrogen dioxide																	
556-88-7	SVOCs	nitroguanidine						1.00E-01	I				8.00E+03					3.50E+05	
79-46-9	VOCs	nitropropane;2-		5.71E-03	I	9.45E+00	H												
1116-54-7	SVOCs	nitrosodiethanolamine;N-				2.80E+00	C			2.80E+00	I			3.60E-01					4.70E+01
55-18-5	SVOCs	nitrosodiethylamine;N-				1.51E+02	I			1.50E+02	I			6.70E-03					8.80E-01
62-75-9	SVOCs	nitrosodimethylamine;N-		1.14E-05	X	4.90E+01	I	8.00E-06	P	5.10E+01	I		6.40E-01	2.00E-02				2.80E+01	2.60E+00
924-16-3	VOCs	nitroso-di-n-butylamine;N-				5.60E+00	I			5.40E+00	I			1.90E-01					2.40E+01
621-64-7	SVOCs	nitroso-di-n-propylamine;N-				7.00E+00	C			7.00E+00	I			1.40E-01	5.60E-05	3.90E-06			1.90E+01
86-30-6	SVOCs	nitrosodiphenylamine;N-				9.10E-03	C			4.90E-03	I			2.00E+02	5.30E-01	2.80E-02			2.70E+04
4549-40-0	SVOCs	nitrosomethylvinylamine,n-																	
759-73-9	SVOCs	nitroso-n-ethylurea;n-				2.70E+01	C			2.70E+01	C			3.70E-02					4.90E+00
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-				2.21E+01	C			2.20E+01	I			4.50E-02					6.00E+00
684-93-5	SVOCs	nitroso-n-methylurea,n-				1.19E+02	C			1.20E+02	C			8.30E-03					1.10E+00
930-55-2	SVOCs	nitrosopyrrolidine;N-				2.14E+00	I			2.10E+00	I			4.80E-01					6.30E+01
99-08-1	Explosives	nitrotoluene, m-						1.00E-04	X				8.00E+00					3.50E+02	
88-72-2	Explosives	nitrotoluene, o-						9.00E-04	P	2.20E-01	P		7.20E+01	4.50E+00				3.20E+03	6.00E+02
99-99-0	Explosives	nitrotoluene, p-						4.00E-03	P	1.60E-02	P		3.20E+02	6.30E+01				1.40E+04	8.20E+03
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-																	
84852-15-3	Phenols	nonylphenol																	
27314-13-2	Pesticides	norflurazon						4.00E-02	I				3.20E+03					1.40E+05	
85509-19-9	Herbicides	nustar						7.00E-04	I				5.60E+01					2.50E+03	
32536-52-0	PBDEs	octabromodiphenyl ether						3.00E-03	I				2.40E+02					1.10E+04	
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine						5.00E-02	I				4.00E+03					1.80E+05	
152-16-9	SVOCs	octamethylpyrophosphoramide						2.00E-03	H				1.60E+02					7.00E+03	
19044-88-3	Pesticides	oryzalin						5.00E-02	I				4.00E+03					1.80E+05	
19666-30-9	Pesticides	oxadiazon						5.00E-03	I				4.00E+02					1.80E+04	
23135-22-0	Pesticides (Carbamate)	oxamyl						2.50E-02	I				2.00E+03					8.80E+04	
42874-03-3	Pesticides	oxyfluorfen						3.00E-03	I				2.40E+02					1.10E+04	
76738-62-0	Herbicides	paclobutrazol						1.30E-02	I				1.00E+03					4.60E+04	
unavailable05	PAHs	PAHs	PAH NOTES																
4685-14-7	Pesticides	paraquat																	
56-38-2	Pesticides	parathion						6.00E-03	H				4.80E+02					2.10E+04	
1114-71-2	Pesticides	pebulate						5.00E-02	H				4.00E+03					1.80E+05	
40487-42-1	Pesticides	pendimethalin						4.00E-02	I				3.20E+03					1.40E+05	
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-						2.00E-02	X	2.30E-02	H		1.60E+03	4.30E+01				7.00E+04	5.70E+03
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-						1.00E-04	I				8.00E+00					3.50E+02	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
32534-81-9	PBDEs	pentabromodiphenyl ethers						2.00E-03	I				1.60E+02					7.00E+03	
608-93-5	SVOCs	pentachlorobenzene						8.00E-04	I				6.40E+01					2.80E+03	
82-68-8	Pesticides	pentachloronitrobenzene						3.00E-03	I	2.60E-01	H		2.40E+02	3.80E+00				1.10E+04	5.00E+02
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT			1.79E-02	C	5.00E-03	I	4.00E-01	I		4.00E+02	2.50E+00	1.60E-02	8.80E-04		1.80E+04	3.30E+02
14797-73-0	Perchlorates	perchlorate and perchlorate salts						7.00E-04	I				5.60E+01					2.50E+03	
52645-53-1	Pesticides	permethrin						5.00E-02	I				4.00E+03					1.80E+05	
72-56-0	Pesticides	perthane																	
unavailable19	General Chemistry	pH	pH NOTES																
85-01-8	PAHs	phenanthrene																	
13684-63-4	Pesticides	phenmedipham						2.50E-01	I				2.00E+04					8.80E+05	
108-95-2	Phenols	phenol		5.71E-02	C			3.00E-01	I				2.40E+04		1.10E+01	7.60E-01		1.10E+06	
106-50-3	SVOCs	phenylenediamine, p-						1.90E-01	H				1.50E+04					6.70E+05	
108-45-2	SVOCs	phenylenediamine;m-						6.00E-03	I				4.80E+02					2.10E+04	
95-54-5	SVOCs	phenylenediamine;o-						4.00E-03	P	4.70E-02	H		3.20E+02	2.10E+01				1.40E+04	2.80E+03
62-38-4	Metals (organometallic)	phenylmercuric acetate						8.00E-05	I				6.40E+00					2.80E+02	
90-43-7	Phenols	phenylphenol;2-								1.90E-03	H			5.30E+02					6.90E+04
298-02-2	Pesticides	phorate						2.00E-04	H				1.60E+01					7.00E+02	
75-44-5	VOCs	phosgene		8.60E-05	I														
732-11-6	Pesticides	phosmet						2.00E-02	I				1.60E+03					7.00E+04	
7803-51-2	Gases	phosphine		8.57E-05	I			3.00E-04	I				2.40E+01					1.10E+03	
7664-38-2	SVOCs	phosphoric acid		2.86E-03	I			4.90E+01	P				3.90E+06					1.70E+08	
7723-14-0	Metals	phosphorus						2.00E-05	I				1.60E+00					7.00E+01	
100-21-0	Phthalates	phthalic acid;p-						1.00E+00	H				8.00E+04					3.50E+06	
85-44-9	Phthalates	phthalic anhydride		5.71E-03	C			2.00E+00	I				1.60E+05					7.00E+06	
1918-02-1	Herbicides	picloram						7.00E-02	I				5.60E+03					2.50E+05	
29232-93-7	Pesticides	pirimiphos-methyl						1.00E-02	I				8.00E+02					3.50E+04	
59536-65-1	PBBs	polybrominated biphenyls				3.01E+01	C	7.00E-06	H	3.00E+01	C		5.60E-01	3.30E-02				2.50E+01	4.40E+00
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)				2.00E+00	I			2.00E+00	I	1.00E+00		5.00E-01			1.00E+01		6.60E+01
151-50-8	Cyanides	potassium cyanide						2.00E-03	I				1.60E+02					7.00E+03	
7778-74-7	Perchlorates	potassium perchlorate						7.00E-04	I				5.60E+01					2.50E+03	
506-61-6	Cyanides	potassium silver cyanide						5.00E-03	I				4.00E+02					1.80E+04	
67747-09-5	Pesticides	prochloraz (not in HSDB)						9.00E-03	I	1.50E-01	I		7.20E+02	6.70E+00				3.20E+04	8.80E+02
26399-36-0	Pesticides	profluralin						6.00E-03	H				4.80E+02					2.10E+04	
1610-18-0	Pesticides	prometon						1.50E-02	I				1.20E+03					5.30E+04	
7287-19-6	Pesticides	prometryn						4.00E-03	I				3.20E+02					1.40E+04	
23950-58-5	Pesticides	pronamide						7.50E-02	I				6.00E+03					2.60E+05	
1918-16-7	Pesticides	propachlor						1.30E-02	I				1.00E+03					4.60E+04	
709-98-8	Pesticides	propanil						5.00E-03	I				4.00E+02					1.80E+04	
2312-35-8	Pesticides	propargite						2.00E-02	I				1.60E+03					7.00E+04	
107-19-7	VOCs	propargyl alcohol						2.00E-03	I				1.60E+02					7.00E+03	
139-40-2	Pesticides	propazine						2.00E-02	I				1.60E+03					7.00E+04	
122-42-9	Pesticides	propham						2.00E-02	I				1.60E+03					7.00E+04	
60207-90-1	Pesticides	propiconazole						1.30E-02	I				1.00E+03					4.60E+04	
123-38-6	VOCs	propionaldehyde		2.30E-03	I														
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-						1.00E-03	I				8.00E+01					3.50E+03	
103-65-1	VOCs	propylbenzene;n-		2.86E-01	X			1.00E-01	X				8.00E+03					3.50E+05	
57-55-6	Glycols	propylene glycol						2.00E+01	P				1.60E+06					7.00E+07	
6423-43-4	Glycols	propylene glycol dinitrate;1,2-		7.71E-05	A														
52125-53-8	Glycols	propylene glycol monoethyl ether						7.00E-01	H				5.60E+04					2.50E+06	
107-98-2	Glycols	propylene glycol monomethyl ether		5.71E-01	I			7.00E-01	H				5.60E+04					2.50E+06	
75-56-9	VOCs	propylene oxide		8.57E-03	I	1.30E-02	I			2.40E-01	I			4.20E+00					5.50E+02
81335-77-5	Pesticides	pursuit						2.50E-01	I				2.00E+04					8.80E+05	
51630-58-1	Pesticides	pydrin						2.50E-02	I				2.00E+03					8.80E+04	
129-00-0	PAHs	pyrene						3.00E-02	I				2.40E+03		6.50E+02	3.30E+01		1.10E+05	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
110-86-1	VOCs	pyridine						1.00E-03	I				8.00E+01					3.50E+03	
13593-03-8	Pesticides	quinalphos						5.00E-04	I				4.00E+01					1.80E+03	
91-22-5	SVOCs	quinoline								3.00E+00	I			3.30E-01					4.40E+01
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE																
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES																
121-82-4	Explosives	rdx						4.00E-03	I	8.00E-02	I		3.20E+02	1.30E+01				1.40E+04	1.60E+03
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE	3.00E-02	A														
10453-86-8	Pesticides	resmethrin						3.00E-02	I				2.40E+03					1.10E+05	
299-84-3	Pesticides	ronnel						5.00E-02	H				4.00E+03					1.80E+05	
83-79-4	Pesticides	rotenone						4.00E-03	I				3.20E+02					1.40E+04	
78-48-8	Pesticides	s,s;s-tributylphosphorotrithioate						3.00E-05	I				2.40E+00					1.10E+02	
78587-05-0	Pesticides	savey						2.50E-02	I				2.00E+03					8.80E+04	
135-98-8	VOCs	sec-butylbenzene						1.00E-01	X				8.00E+03					3.50E+05	
7783-00-8	Metals	selenious acid						5.00E-03	I				4.00E+02					1.80E+04	
7782-49-2	Metals	selenium and compounds		5.71E-03	C			5.00E-03	I				4.00E+02		5.20E+00	2.60E-01		1.80E+04	
630-10-4	Metals (organometallic)	selenourea																	
74051-80-2	Pesticides	sethoxydim						9.00E-02	I				7.20E+03					3.20E+05	
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT					5.00E-03	I				4.00E+02		1.40E+01	6.90E-01		1.80E+04	
506-64-9	Cyanides	silver cyanide						1.00E-01	I				8.00E+03					3.50E+05	
122-34-9	Pesticides	simazine						5.00E-03	I	1.20E-01	H		4.00E+02	8.30E+00				1.80E+04	1.10E+03
26628-22-8	Metals	sodium azide						4.00E-03	I				3.20E+02					1.40E+04	
143-33-9	Cyanides	sodium cyanide						1.00E-03	I				8.00E+01					3.50E+03	
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate						3.00E-02	I	2.70E-01	H		2.40E+03	3.70E+00				1.10E+05	4.90E+02
62-74-8	Metals (organometallic)	sodium fluoroacetate						2.00E-05	I				1.60E+00					7.00E+01	
13718-26-8	Metals	sodium metavanadate						1.00E-03	H				8.00E+01					3.50E+03	
7601-89-0	Perchlorates	sodium perchlorate						7.00E-04	I				5.60E+01					2.50E+03	
7440-24-6	Metals	strontium						6.00E-01	I				4.80E+04					2.10E+06	
57-24-9	SVOCs	strychnine						3.00E-04	I				2.40E+01					1.10E+03	
100-42-5	VOCs	styrene		2.86E-01	I			2.00E-01	I				1.60E+04		2.20E+00	1.20E-01		7.00E+05	
unavailable17	Metals	sulfate																	
88671-89-0	Pesticides	systhane						2.50E-02	I				2.00E+03					8.80E+04	
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES	1.14E-08	C	1.33E+05	C	7.00E-10	I	1.30E+05	C		9.30E-05	1.30E-05				4.10E-03	1.70E-03
34014-18-1	Pesticides	tebuthiuron						7.00E-02	I				5.60E+03					2.50E+05	
3383-96-8	Pesticides	temephos						2.00E-02	H				1.60E+03					7.00E+04	
5902-51-2	Pesticides	terbacil						1.30E-02	I				1.00E+03					4.60E+04	
13071-79-9	SVOCs	terbufos						2.50E-05	H				2.00E+00					8.80E+01	
886-50-0	Pesticides	terbutryn						1.00E-03	I				8.00E+01					3.50E+03	
98-06-6	VOCs	tert-butylbenzene						1.00E-01	X				8.00E+03					3.50E+05	
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'						1.00E-04	I				8.00E+00					3.50E+02	
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-						3.00E-04	I				2.40E+01					1.10E+03	
630-20-6	VOCs	tetrachloroethane;1,1,1,2-				2.59E-02	I	3.00E-02	I	2.60E-02	I		2.40E+03	3.80E+01				1.10E+05	5.00E+03
79-34-5	VOCs	tetrachloroethane;1,1,2,2-				2.03E-01	C	2.00E-02	I	2.00E-01	I		1.60E+03	5.00E+00	1.20E-03	8.00E-05		7.00E+04	6.60E+02
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES	1.14E-02	I	9.10E-04	I	6.00E-03	I	2.10E-03	I	5.00E-02	4.80E+02	4.80E+02	5.00E-02	2.80E-03	5.00E-02	2.10E+04	6.30E+04
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT					3.00E-02	I				2.40E+03					1.10E+05	
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-								2.00E+01	H			5.00E-02					6.60E+00
961-11-5	Pesticides	tetrachlorvinphos						3.00E-02	I	2.40E-02	H		2.40E+03	4.20E+01				1.10E+05	5.50E+03
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate						5.00E-04	I				4.00E+01					1.80E+03	
78-00-2	Metals (organometallic)	tetraethyl lead						1.00E-07	I				8.00E-03					3.50E-01	
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-		2.29E+01	I														
109-99-9	Furans	tetrahydrofuran		5.70E-01	I			9.00E-01	I				7.20E+04					3.20E+06	
1314-32-5	Metals	thallic oxide						2.00E-05	S				1.60E+00					7.00E+01	
563-68-8	Metals	thallium acetate						1.00E-05	X				8.00E-01					3.50E+01	
6533-73-9	Metals	thallium carbonate						2.00E-05	X				1.60E+00					7.00E+01	
7791-12-0	Metals	thallium chloride						1.00E-05	X				8.00E-01					3.50E+01	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	RfDi Inhalation Reference Dose (mg/kg-day)	Source	CPFi Inhalation Cancer Potency Factor (kg-day/mg)	Source	RfDo Oral Reference Dose (mg/kg-day)	Source	CPFo Oral Cancer Potency Factor (kg-day/mg)	Source	Soil Method A Unrestricted Land Use (mg/kg)	Soil Method B Non cancer (mg/kg)	Soil Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	Soil Protective of Groundwater Saturated see guidance (mg/kg)	Soil Method A Industrial Properties (mg/kg)	Soil Method C Non cancer (mg/kg)	Soil Method C Cancer (mg/kg)
10102-45-1	Metals	thallium nitrate						1.00E-05	X				8.00E-01					3.50E+01	
12039-52-0	Metals	thallium selenite						1.00E-05	S				8.00E-01					3.50E+01	
7446-18-6	Metals	thallium(I) sulfate						2.00E-05	X				1.60E+00					7.00E+01	
7440-28-0	Metals	thallium, soluble salts						1.00E-05	X				8.00E-01		2.30E-01	1.10E-02		3.50E+01	
28249-77-6	Pesticides	thiobencarb						1.00E-02	I				8.00E+02					3.50E+04	
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-						3.00E-02	H				2.40E+03					1.10E+05	
39196-18-4	Pesticides	thiofanox						3.00E-04	H				2.40E+01					1.10E+03	
23564-05-8	Pesticides	thiophanate-methyl						8.00E-02	I				6.40E+03					2.80E+05	
137-26-8	Pesticides	thiram						5.00E-03	I				4.00E+02					1.80E+04	
7440-31-5	Metals	tin						6.00E-01	H				4.80E+04					2.10E+06	
118-96-7	Explosives	tnt						5.00E-04	I	3.00E-02	I		4.00E+01	3.30E+01				1.80E+03	4.40E+03
108-88-3	VOCs	toluene		1.43E+00	I			8.00E-02	I			7.00E+00	6.40E+03		4.50E+00	2.70E-01	7.00E+00	2.80E+05	
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-				3.85E-02	C			3.90E-02	C			2.60E+01					3.40E+03
584-84-9	VOCs	toluene-2,4-diisocyanate		2.29E-06	C	3.85E-02	C			3.90E-02	C			2.60E+01					3.40E+03
91-08-7	VOCs	toluene-2,6-diisocyanate		2.29E-06	C	3.85E-02	C			3.90E-02	C			2.60E+01					3.40E+03
95-80-7	SVOCs	toluenediamine;2,4-																	
95-70-5	SVOCs	toluenediamine;2,5-						2.00E-04	X	1.80E-01	X		1.60E+01	5.60E+00				7.00E+02	7.30E+02
823-40-5	SVOCs	toluenediamine;2,6-																	
106-49-0	SVOCs	toluidine;p-						4.00E-03	X	3.00E-02	P		3.20E+02	3.30E+01				1.40E+04	4.40E+03
unavailable18	General Chemistry	total dissolved solids																	
8001-35-2	Pesticides	toxaphene				1.12E+00	I	9.00E-05	P	1.10E+00	I		7.20E+00	9.10E-01	1.50E+00	7.60E-02		3.20E+02	1.20E+02
93-72-1	Herbicides	tp;2,4,5-						8.00E-03	I				6.40E+02					2.80E+04	
unavailable09	Petroleum	tph, diesel range organics										2.00E+03					2.00E+03		
unavailable10	Petroleum	tph, heavy oils										2.00E+03					2.00E+03		
unavailable11	Petroleum	tph, mineral oils										4.00E+03					4.00E+03		
unavailable25	Petroleum	tph: gasoline range organics, benzene present										3.00E+01					3.00E+01		
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene										1.00E+02					1.00E+02		
66841-25-6	Pesticides	tralomethrin						7.50E-03	I				6.00E+02					2.60E+04	
2303-17-5	Pesticides	triallate						1.30E-02	I				1.00E+03					4.60E+04	
82097-50-5	Pesticides	triasulfuron						1.00E-02	I				8.00E+02					3.50E+04	
615-54-3	VOCs	tribromobenzene;1,2,4-						5.00E-03	I				4.00E+02					1.80E+04	
688-73-3	Organotins	tributyltin																	
56-35-9	Organotins	tributyltin oxide						3.00E-04	I				2.40E+01					1.10E+03	
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS																
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-		1.43E+00	P			3.00E+01	I				2.40E+06					1.10E+08	
76-03-9	SVOCs	trichloroacetic acid						2.00E-02	I	7.00E-02	I		1.60E+03	1.40E+01				7.00E+04	1.90E+03
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-								2.90E-02	H			3.40E+01					4.50E+03
634-93-5	SVOCs	trichloroaniline;2,4,6-						3.00E-05	X	7.00E-03	X		2.40E+00	1.40E+02				1.10E+02	1.90E+04
120-82-1	VOCs	trichlorobenzene;1,2,4-		5.71E-04	P			1.00E-02	I	2.90E-02	P		8.00E+02	3.40E+01	5.60E-01	2.90E-02		3.50E+04	4.50E+03
71-55-6	VOCs	trichloroethane;1,1,1-		1.43E+00	I			2.00E+00	I			2.00E+00	1.60E+05		1.50E+00	8.40E-02	2.00E+00	7.00E+06	
79-00-5	VOCs	trichloroethane;1,1,2-		5.71E-05	X	5.60E-02	I	4.00E-03	I	5.70E-02	I		3.20E+02	1.80E+01	2.80E-02	1.80E-03		1.40E+04	2.30E+03
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES	5.71E-04	I	1.44E-02	I	5.00E-04	I	4.64E-02	I	3.00E-02	4.00E+01	1.20E+01	2.50E-02	1.50E-03	3.00E-02	1.80E+03	2.80E+03
75-69-4	VOCs	trichlorofluoromethane		2.00E-01	H			3.00E-01	I				2.40E+04					1.10E+06	
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT					1.00E-01	I				8.00E+03		2.90E+01	1.50E+00		3.50E+05	
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT			1.09E-02	I	1.00E-03	P	1.10E-02	I		8.00E+01	9.10E+01	4.60E-02	2.70E-03		3.50E+03	1.20E+04
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-						1.00E-02	I				8.00E+02					3.50E+04	
598-77-6	VOCs	trichloropropane;1,1,2-						5.00E-03	I				4.00E+02					1.80E+04	
96-18-4	VOCs	trichloropropane;1,2,3-		8.57E-05	I			4.00E-03	I	3.00E+01	I		3.20E+02	3.30E-02				1.40E+04	4.40E+00
96-19-5	VOCs	trichloropropene;1,2,3-		8.57E-05	P			3.00E-03	X				2.40E+02					1.10E+04	
58138-08-2	Pesticides	tridiphane						3.00E-03	I				2.40E+02					1.10E+04	
121-44-8	VOCs	triethylamine		2.00E-03	I														
1582-09-8	Pesticides	trifluralin						7.50E-03	I	7.70E-03	I		6.00E+02	1.30E+02				2.60E+04	1.70E+04
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES																
512-56-1	SVOCs	trimethyl phosphate						1.00E-02	P	2.00E-02	P		8.00E+02	5.00E+01				3.50E+04	6.60E+03
526-73-8	VOCs	trimethylbenzene;1,2,3-		1.70E-02	I			1.00E-02	I				8.00E+02					3.50E+04	
95-63-6	VOCs	trimethylbenzene;1,2,4-		1.70E-02	I			1.00E-02	I				8.00E+02					3.50E+04	
108-67-8	VOCs	trimethylbenzene;1,3,5-		1.70E-02	I			1.00E-02	I				8.00E+02					3.50E+04	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**RfDi** Inhalation Reference Dose (mg/kg-day)	Source	**CPFi** Inhalation Cancer Potency Factor (kg-day/mg)	Source	**RfDo** Oral Reference Dose (mg/kg-day)	Source	**CPFo** Oral Cancer Potency Factor (kg-day/mg)	Source	**Soil** Method A Unrestricted Land Use (mg/kg)	**Soil** Method B Non cancer (mg/kg)	**Soil** Method B Cancer (mg/kg)	**Soil** Protective of Groundwater Vadose @ 13 degrees C see guidance (mg/kg)	**Soil** Protective of Groundwater Saturated see guidance (mg/kg)	**Soil** Method A Industrial Properties (mg/kg)	**Soil** Method C Non cancer (mg/kg)	**Soil** Method C Cancer (mg/kg)
99-35-4	Explosives	trinitrobenzene;1,3,5-						3.00E-02	I				2.40E+03					1.10E+05	
479-45-8	Explosives	trinitrophenylmethylnitramine						2.00E-03	P				1.60E+02					7.00E+03	
unavailable12	Radionuclides	uranium, soluble salts		1.14E-05	A			3.00E-03	I				2.40E+02					1.10E+04	
7440-62-2	Metals	vanadium		2.86E-05	A			5.00E-03	S				4.00E+02		1.60E+03	8.00E+01		1.80E+04	
1314-62-1	Metals	vanadium pentoxide		2.00E-06	P	2.91E+01	P	9.00E-03	I				7.20E+02					3.20E+04	
27774-13-6	Metals	vanadyl sulfate																	
1929-77-7	Pesticides	vernam						1.00E-03	I				8.00E+01					3.50E+03	
50471-44-8	Pesticides	vinclozolin						2.50E-02	I				2.00E+03					8.80E+04	
108-05-4	VOCs	vinyl acetate		5.71E-02	I			1.00E+00	H				8.00E+04		3.30E+01	2.30E+00		3.50E+06	
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES	2.86E-02	I	3.10E-02	I	3.00E-03	I	1.50E+00	I		2.40E+02	6.70E-01	1.70E-03	8.90E-05		1.10E+04	8.80E+01
81-81-2	Pesticides	warfarin						3.00E-04	I				2.40E+01					1.10E+03	
8012-95-1	Petroleum	white mineral oil						3.00E+00	P				2.40E+05					1.10E+07	
108-38-3	VOCs	xylene;m-		2.86E-02	S			2.00E-01	S				1.60E+04		1.30E+01	7.70E-01		7.00E+05	
95-47-6	VOCs	xylene;o-		2.86E-02	S			2.00E-01	S				1.60E+04		1.40E+01	8.40E-01		7.00E+05	
106-42-3	VOCs	xylene;p-		2.86E-02	S			2.00E-01	S				1.60E+04		1.70E+01	9.60E-01		7.00E+05	
1330-20-7	VOCs	xylenes		2.86E-02	I			2.00E-01	I			9.00E+00	1.60E+04		1.40E+01	8.30E-01	9.00E+00	7.00E+05	
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT					3.00E-01	I				2.40E+04		6.00E+03	3.00E+02		1.10E+06	
557-21-1	Cyanides	zinc cyanide						5.00E-02	I				4.00E+03					1.80E+05	
1314-84-7	Metals	zinc phosphide						3.00E-04	I				2.40E+01					1.10E+03	
12122-67-7	Pesticides	zineb						5.00E-02	I				4.00E+03					1.80E+05	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
83-32-9	PAHs	acenaphthene			9.60E+02		2.10E+03					6.40E+02		1.60E+03	
208-96-8	PAHs	acenaphthylene													
30560-19-1	Pesticides	acephate			6.40E+01	1.00E+01	1.40E+02	1.00E+02							
75-07-0	VOCs	acetaldehyde													
34256-82-1	Pesticides	acetochlor			3.20E+02		7.00E+02								
67-64-1	VOCs	acetone			7.20E+03		1.60E+04								
75-86-5	VOCs	acetone cyanohydrin													
75-05-8	VOCs	acetonitrile													
98-86-2	SVOCs	acetophenone			8.00E+02		1.80E+03								
62476-59-9	Herbicides	acifluorfen, sodium			1.00E+02		2.30E+02								
107-02-8	VOCs	acrolein			4.00E+00		8.80E+00								
79-06-1	VOCs	acrylamide			1.60E+01	8.80E-02	3.50E+01	8.80E-01	0.00E+00						
79-10-7	VOCs	acrylic acid			4.00E+03		8.80E+03								
107-13-1	VOCs	acrylonitrile			3.20E+02	8.10E-02	7.00E+02	8.10E-01				3.50E+03	4.00E-01	8.60E+03	1.00E+01
15972-60-8	Pesticides	alachlor			1.60E+02	1.60E+00	3.50E+02	1.60E+01	0.00E+00	2.00E+00	2.00E+00				
1596-84-5	Pesticides	alar			2.40E+03	4.90E+00	5.30E+03	4.90E+01							
116-06-3	Pesticides (Carbamate)	aldicarb			1.60E+01		3.50E+01								
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone			1.60E+01		3.50E+01								
309-00-2	Pesticides	aldrin			2.40E-01	2.60E-03	5.30E-01	2.60E-02				1.70E-02	8.20E-05	4.20E-02	2.00E-03
74223-64-6	Pesticides	ally			4.00E+03		8.80E+03								
107-18-6	VOCs	allyl alcohol			4.00E+01		8.80E+01								
107-05-1	VOCs	allyl chloride				2.10E+00		2.10E+01							
7429-90-5	Metals	aluminum			1.60E+04		3.50E+04								
20859-73-8	Metals	aluminum phosphide			6.40E+00		1.40E+01								
67485-29-4	Pesticides	amdro			4.80E+00		1.10E+01								
834-12-8	Pesticides	ametryn			1.40E+02		3.20E+02								
591-27-5	Phenols	aminophenol;m-			1.30E+03		2.80E+03								
504-24-5	SVOCs	aminopyridine;4-													
33089-61-1	Pesticides	amitraz			4.00E+01		8.80E+01								
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES												
7790-98-9	Perchlorates	ammonium perchlorate			1.10E+01		2.50E+01								
7773-06-0	Pesticides	ammonium sulfamate			3.20E+03		7.00E+03								
62-53-3	SVOCs	aniline			5.60E+01	7.70E+00	1.20E+02	7.70E+01							
120-12-7	PAHs	anthracene			4.80E+03		1.10E+04					2.60E+04		6.50E+04	
7440-36-0	Metals	antimony			6.40E+00		1.40E+01		6.00E+00	6.00E+00	6.00E+00	1.00E+03		2.60E+03	
1314-60-9	Metals	antimony pentoxide			8.00E+00		1.80E+01								
28300-74-5	Metals	antimony potassium tartrate			1.40E+01		3.20E+01								
1332-81-6	Metals	antimony tetroxide			6.40E+00		1.40E+01								
1309-64-4	Metals	antimony trioxide													
74115-24-5	Pesticides	apollo			2.10E+02		4.60E+02								
140-57-8	SVOCs	aramite			8.00E+02	3.50E+00	1.80E+03	3.50E+01							
12674-11-2	PCBs	aroclor 1016			1.10E+00	1.30E+00	2.50E+00	1.30E+01				5.80E-03	3.00E-03	1.50E-02	7.40E-02
11097-69-1	PCBs	aroclor 1254			3.20E-01	4.40E-02	7.00E-01	4.40E-01				1.70E-03	1.00E-04	4.20E-03	2.60E-03
11096-82-5	PCBs	aroclor 1260				4.40E-02		4.40E-01							
7440-38-2	Metals	arsenic, inorganic		5.00E+00	4.80E+00	5.80E-02	1.10E+01	5.80E-01	0.00E+00	1.00E+01	1.00E+01	1.80E+01	9.80E-02	4.40E+01	2.50E+00
7784-42-1	Metals	arsine			2.80E-02		6.10E-02								
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE						7.00E+06	7.00E+06	7.00E+06				
76578-14-8	Pesticides	assure			1.40E+02		3.20E+02								
3337-71-1	Pesticides	asulam			8.00E+02		1.80E+03								
1912-24-9	Pesticides	atrazine			5.60E+02	3.80E-01	1.20E+03	3.80E+00	3.00E+00	3.00E+00	3.00E+00				
65195-55-3	Pesticides	avermectin B1			6.40E+00		1.40E+01								
103-33-3	Pesticides	azobenzene				8.00E-01		8.00E+00							
7440-39-3	Metals	barium and compounds			3.20E+03		7.00E+03		2.00E+03	2.00E+03	2.00E+03				
542-62-1	Metals	barium cyanide													

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
114-26-1	Pesticides	baygon			6.40E+01		1.40E+02								
43121-43-3	Pesticides	bayleton			4.80E+02		1.10E+03								
68359-37-5	Pesticides	baythroid			4.00E+02		8.80E+02								
1861-40-1	Pesticides	benefin			2.40E+03		5.30E+03								
17804-35-2	Pesticides	benomyl			8.00E+02		1.80E+03								
25057-89-0	Herbicides	bentazon			4.80E+02		1.10E+03								
100-52-7	SVOCs	benzaldehyde			8.00E+02	1.10E+01	1.80E+03	1.10E+02							
71-43-2	VOCs	BENZENE		5.00E+00	3.20E+01	8.00E-01	7.00E+01	8.00E+00	0.00E+00	5.00E+00	5.00E+00	2.00E+03	2.30E+01	5.00E+03	5.70E+02
108-98-5	SVOCs	benzenethiol			8.00E+00		1.80E+01								
92-87-5	SVOCs	benzidine			4.80E+01	3.80E-04	1.10E+02	3.80E-03				8.90E+01	3.20E-04	2.20E+02	8.10E-03
191-24-2	PAHs	benzo(g,h,i)perylene													
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES												
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES	1.00E-01	4.80E+00	2.30E-02	1.10E+01	2.30E-01	0.00E+00	2.00E-01	2.00E-01	2.60E+01	3.50E-02	6.50E+01	8.80E-01
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES												
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES												
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT		6.40E+04		1.40E+05								
98-07-7	VOCs	benzotrichloride				3.40E-03		3.40E-02							
100-51-6	SVOCs	benzyl alcohol			8.00E+02		1.80E+03								
100-44-7	VOCs	benzyl chloride			1.60E+01	2.60E-01	3.50E+01	2.60E+00							
7440-41-7	Metals	beryllium			3.20E+01		7.00E+01		4.00E+00	4.00E+00	4.00E+00	2.70E+02		6.80E+02	
91-58-7	PAHs	beta-chloronaphthalene			6.40E+02		1.40E+03					1.00E+03		2.60E+03	
141-66-2	SVOCs	bidrin			1.60E+00		3.50E+00								
82657-04-3	Pesticides	biphenthrin			2.40E+02		5.30E+02								
92-52-4	PAHs	biphenyl;1,1-			4.00E+03	5.50E+00	8.80E+03	5.50E+01							
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether			3.20E+02	6.30E-01	7.00E+02	6.30E+00				4.20E+04	3.70E+01	1.00E+05	9.40E+02
111-44-4	SVOCs	bis(2-chloroethyl)ether				4.00E-02		4.00E-01					8.50E-01		2.10E+01
39638-32-9	VOCs	bis(2-chloroisopropyl) ether													
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate			3.20E+02	6.30E+00	7.00E+02	6.30E+01	0.00E+00	6.00E+00	6.00E+00	4.00E+02	3.60E+00	1.00E+03	8.90E+01
542-88-1	VOCs	bis(chloromethyl)ether				2.00E-04		2.00E-03							
80-05-7	Phenols	bisphenol a			8.00E+02		1.80E+03								
7440-42-8	Metals	boron			3.20E+03		7.00E+03								
15541-45-4	Pesticides	bromate			6.40E+01	1.30E-01	1.40E+02	1.30E+00	0.00E+00	1.00E+01	1.00E+01				
79-08-3	SVOCs	bromoacetic acid								6.00E+01	6.00E+01				
108-86-1	VOCs	bromobenzene			6.40E+01		1.40E+02								
75-27-4	VOCs	bromodichloromethane	TTHM NOTES		1.60E+02	7.10E-01	3.50E+02	7.10E+00	0.00E+00	8.00E+01	8.00E+01	1.40E+04	2.80E+01	3.50E+04	7.00E+02
593-60-2	VOCs	bromoethene													
75-25-2	VOCs	bromoform	TTHM NOTES		1.60E+02	5.50E+00	3.50E+02	5.50E+01	0.00E+00	8.00E+01	8.00E+01	1.40E+04	2.20E+02	3.50E+04	5.50E+03
74-83-9	VOCs	bromomethane			1.10E+01		2.50E+01					9.70E+02		2.40E+03	
2104-96-3	Pesticides	bromophos			8.00E+01		1.80E+02								
1689-84-5	Herbicides	bromoxynil			3.20E+02		7.00E+02								
1689-99-2	Pesticides	bromoxynil octanoate			3.20E+02		7.00E+02								
106-99-0	VOCs	butadiene;1,3-				7.30E-02		7.30E-01							
71-36-3	VOCs	butanol;n-			8.00E+02		1.80E+03								
85-68-7	Phthalates	butyl benzyl phthalate			3.20E+03	4.60E+01	7.00E+03	4.60E+02				1.30E+03	8.20E+00	3.10E+03	2.10E+02
2008-41-5	Pesticides	butylate			4.00E+02		8.80E+02								
85-70-1	Phthalates	butylphthalyl butylglycolate			1.60E+04		3.50E+04								
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-			1.60E+02		3.50E+02								
75-60-5	Pesticides	cacodylic acid			3.20E+02		7.00E+02								
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES	5.00E+00	8.00E+00		1.80E+01		5.00E+00	5.00E+00	5.00E+00				
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES									4.10E+01		1.00E+02	
592-01-8	Cyanides	calcium cyanide			1.60E+01		3.50E+01								
105-60-2	SVOCs	caprolactam			8.00E+03		1.80E+04								
2425-06-1	Pesticides	captafol			3.20E+01	5.80E-01	7.00E+01	5.80E+00							
133-06-2	Pesticides	captan			2.10E+03	3.80E+01	4.60E+03	3.80E+02							

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63-25-2	Pesticides (Carbamate)	carbaryl			1.60E+03		3.50E+03								
86-74-8	PAHs	carbazole													
1563-66-2	Pesticides (Carbamate)	carbofuran			8.00E+01		1.80E+02		4.00E+01	4.00E+01	4.00E+01				
75-15-0	VOCs	carbon disulfide			8.00E+02		1.80E+03								
56-23-5	VOCs	carbon tetrachloride			3.20E+01	6.30E-01	7.00E+01	6.30E+00	0.00E+00	5.00E+00	5.00E+00	5.50E+02	4.90E+00	1.40E+03	1.20E+02
786-19-6	Pesticides	carbophenothion													
55285-14-8	Pesticides	carbosulfan			1.60E+02		3.50E+02								
5234-68-4	Pesticides	carboxin			1.60E+03		3.50E+03								
1306-38-3	Metals	cerium oxide and cerium compounds													
75-87-6	VOCs	chloral													
302-17-0	VOCs	chloral hydrate			8.00E+02		1.80E+03								
133-90-4	Herbicides	chloramben			2.40E+02		5.30E+02								
118-75-2	Pesticides	chloranil				2.20E-01		2.20E+00							
12789-03-6	Pesticides	chlordane			8.00E+00	2.50E-01	1.80E+01	2.50E+00	0.00E+00	2.00E+00	2.00E+00	9.20E-02	1.30E-03	2.30E-01	3.30E-02
143-50-0	SVOCs	chlordecone (kepone)			4.80E+00	8.80E-03	1.10E+01	8.80E-02							
16887-00-6	Nutrients	chloride													
90982-32-4	Pesticides	chlorimuron-ethyl			3.20E+02		7.00E+02								
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS		8.00E+02		1.80E+03		4.00E+03	4.00E+03	4.00E+03				
506-77-4	Cyanides	chlorine cyanide			4.00E+02		8.80E+02								
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS		2.40E+02		5.30E+02		8.00E+02	8.00E+02	8.00E+02				
7758-19-2	Nutrients	chlorite			4.80E+02		1.10E+03		8.00E+02	1.00E+03	1.00E+03				
75-68-3	VOCs	chloro-1,1-difluoroethane;1-													
126-99-8	VOCs	chloro-1,3-butadiene;2-			1.60E+02		3.50E+02								
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-				1.90E-01		1.90E+00							
95-69-2	SVOCs	chloro-2-methylaniline;4-			4.80E+01	8.80E-01	1.10E+02	8.80E+00							
79-11-8	SVOCs	chloroacetic acid			3.20E+01		7.00E+01		7.00E+01	6.00E+01	6.00E+01				
532-27-4	SVOCs	chloroacetophenone;2-													
106-47-8	SVOCs	chloroaniline;p-			3.20E+01	2.20E-01	7.00E+01	2.20E+00							
108-90-7	VOCs	chlorobenzene			1.60E+02		3.50E+02		1.00E+02	1.00E+02	1.00E+02	5.00E+03		1.30E+04	
510-15-6	Pesticides	chlorobenzilate			3.20E+02	8.00E-01	7.00E+02	8.00E+00							
74-11-3	Pesticides	chlorobenzoic acid;p-			4.80E+02		1.10E+03								
98-56-6	VOCs	chlorobenzotrifluoride;4-			2.40E+01		5.30E+01								
109-69-3	VOCs	chlorobutane;1-			3.20E+02		7.00E+02								
59-50-7	Phenols	chlorocresol			1.60E+03		3.50E+03								
75-45-6	VOCs	chlorodifluoromethane													
67-66-3	VOCs	chloroform	TTHM NOTES		8.00E+01	1.40E+00	1.80E+02	1.40E+01	7.00E+01	8.00E+01	8.00E+01	6.90E+03	5.60E+01	1.70E+04	1.40E+03
74-87-3	VOCs	chloromethane													
107-30-2	VOCs	chloromethyl methyl ether				1.80E-02		1.80E-01							
88-73-3	Pesticides	chloronitrobenzene;o-			4.80E+01	2.90E-01	1.10E+02	2.90E+00							
100-00-5	Pesticides	chloronitrobenzene;p-			5.60E+00	7.30E-01	1.20E+01	7.30E+00							
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT		4.00E+01		8.80E+01					9.70E+01		2.40E+02	
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-													
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-													
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-													
75-29-6	VOCs	chloropropane;2-													
1897-45-6	Pesticides	chlorothalonil			2.40E+02	2.80E+01	5.30E+02	2.80E+02							
95-49-8	VOCs	chlorotoluene;o-			1.60E+02		3.50E+02								
101-21-3	Pesticides	chlorpropham			3.20E+03		7.00E+03								
2921-88-2	Pesticides	chlorpyrifos			1.60E+01		3.50E+01								
5598-13-0	Pesticides	chlorpyrifos-methyl			1.60E+02		3.50E+02								
64902-72-3	Herbicides	chlorsulfuron			8.00E+02		1.80E+03								
60238-56-4	Pesticides	chlorthiophos			1.30E+01		2.80E+01								
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES	5.00E+01					1.00E+02	1.00E+02	1.00E+02				
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES		2.40E+04		5.30E+04					2.40E+05		6.10E+05	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES		4.80E+01		1.10E+02					4.90E+02		1.20E+03	
218-01-9	cPAHs	CHRYSENE	PAH NOTES												
8001-58-9	PAHs	coal tar creosote													
8007-45-2	VOCs	coke oven emissions													
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT		6.40E+02		1.40E+03		1.30E+03	1.30E+03	1.30E+03	2.90E+03		7.20E+03	
544-92-3	Cyanides	copper cyanide			8.00E+01		1.80E+02								
108-39-4	Phenols	cresol;m-			4.00E+02		8.80E+02								
95-48-7	Phenols	cresol;o-			4.00E+02		8.80E+02								
106-44-5	Phenols	cresol;p-			8.00E+02		1.80E+03								
4170-30-3	VOCs	crotonaldehyde			8.00E+00	2.30E-02	1.80E+01	2.30E-01							
98-82-8	VOCs	cumene			8.00E+02		1.80E+03								
21725-46-2	Pesticides	cyanazine			3.20E+01	1.00E-01	7.00E+01	1.00E+00							
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES		1.00E+01		2.20E+01		2.00E+02	2.00E+02	2.00E+02	1.60E+03		4.10E+03	
460-19-5	Cyanides	cyanogen			8.00E+00		1.80E+01								
506-68-3	Cyanides	cyanogen bromide			7.20E+02		1.60E+03								
110-82-7	VOCs	cyclohexane													
108-94-1	VOCs	cyclohexanone			4.00E+04		8.80E+04								
108-91-8	SVOCs	cyclohexylamine			1.60E+03		3.50E+03								
542-92-7	SVOCs	cyclopentadiene													
68085-85-8	Pesticides	cyhalothrin/karate			8.00E+01		1.80E+02								
52315-07-8	Pesticides	cypermethrin			1.60E+02		3.50E+02								
66215-27-8	Pesticides	cyromazine			1.20E+02		2.60E+02								
1861-32-1	Herbicides	dacthal			1.60E+02		3.50E+02								
75-99-0	Herbicides	dalapon, sodium salt			2.40E+02		5.30E+02		2.00E+02	2.00E+02	2.00E+02				
39515-41-8	Pesticides	danitol			4.00E+02		8.80E+02								
94-82-6	Herbicides	db;2,4-			1.30E+02		2.80E+02								
72-54-8	Pesticides	ddd			4.80E-01	3.60E-01	1.10E+00	3.60E+00				1.50E-03	5.00E-04	3.60E-03	1.30E-02
72-55-9	Pesticides	dde			4.80E+00	2.60E-01	1.10E+01	2.60E+00				1.50E-02	3.60E-04	3.60E-02	8.90E-03
50-29-3	Pesticides	ddt		3.00E-01	8.00E+00	2.60E-01	1.80E+01	2.60E+00				2.40E-02	3.60E-04	6.00E-02	8.90E-03
1163-19-5	PBDEs	decabromodiphenyl ether			1.10E+02	1.30E+02	2.50E+02	1.30E+03				5.70E+03	2.90E+03	1.40E+04	7.20E+04
8065-48-3	Pesticides	demeton			6.40E-01		1.40E+00								
103-23-1	Phthalates	di(2-ethylhexyl)adipate			9.60E+03	7.30E+01	2.10E+04	7.30E+02	4.00E+02	4.00E+02	4.00E+02				
2303-16-4	Pesticides	diallate				1.40E+00		1.40E+01							
333-41-5	Pesticides	diazinon			1.10E+01		2.50E+01								
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES												
132-64-9	PAHs	dibenzofuran			1.60E+01		3.50E+01								
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-			1.60E+00	5.50E-02	3.50E+00	5.50E-01	0.00E+00	2.00E-01	2.00E-01				
631-64-1	SVOCs	dibromoacetic acid								6.00E+01	6.00E+01				
106-37-6	Pesticides	dibromobenzene;1,4-			8.00E+01		1.80E+02								
124-48-1	VOCs	dibromochloromethane	TTHM NOTES		1.60E+02	5.20E-01	3.50E+02	5.20E+00	6.00E+01	8.00E+01	8.00E+01	1.40E+04	2.10E+01	3.50E+04	5.10E+02
84-74-2	Phthalates	di-butyl phthalate			1.60E+03		3.50E+03					2.90E+03		7.30E+03	
1918-00-9	Herbicides	dicamba			4.80E+02		1.10E+03								
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS						4.00E+03	4.00E+03	4.00E+03				
764-41-0	VOCs	dichloro-2-butene;1,4-													
79-43-6	SVOCs	dichloroacetic acid			6.40E+01	1.80E+00	1.40E+02	1.80E+01	0.00E+00	6.00E+01	6.00E+01				
95-50-1	VOCs	dichlorobenzene;1,2-			7.20E+02		1.60E+03		6.00E+02	6.00E+02	6.00E+02	4.20E+03		1.00E+04	
541-73-1	VOCs	dichlorobenzene;1,3-													
106-46-7	VOCs	dichlorobenzene;1,4-			5.60E+02	8.10E+00	1.20E+03	8.10E+01	7.50E+01	7.50E+01	7.50E+01	3.30E+03	2.20E+01	8.20E+03	5.40E+02
91-94-1	SVOCs	dichlorobenzidine;3,3'-				1.90E-01		1.90E+00					4.60E-02		1.20E+00
75-71-8	VOCs	dichlorodifluoromethane			1.60E+03		3.50E+03								
75-34-3	VOCs	dichloroethane;1,1-			1.60E+03	7.70E+00	3.50E+03	7.70E+01							
107-06-2	VOCs	dichloroethane;1,2-		5.00E+00	4.80E+01	4.80E-01	1.10E+02	4.80E+00	0.00E+00	5.00E+00	5.00E+00	1.30E+04	5.90E+01	3.20E+04	1.50E+03
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)			7.20E+01		1.60E+02								
75-35-4	VOCs	dichloroethylene;1,1-			4.00E+02		8.80E+02		7.00E+00	7.00E+00	7.00E+00	2.30E+04		5.80E+04	
156-59-2	VOCs	dichloroethylene;1,2-,cis			1.60E+01		3.50E+01		7.00E+01	7.00E+01	7.00E+01				
156-60-5	VOCs	dichloroethylene;1,2-,trans			1.60E+02		3.50E+02		1.00E+02	1.00E+02	1.00E+02	3.30E+04		8.20E+04	
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT		2.40E+01		5.30E+01					1.90E+02		4.80E+02	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-			1.60E+02		3.50E+02		7.00E+01	7.00E+01	7.00E+01				
78-87-5	VOCs	dichloropropane;1,2-			3.20E+02	1.20E+00	7.00E+02	1.20E+01	0.00E+00	5.00E+00	5.00E+00	2.50E+04	4.30E+01	6.30E+04	1.10E+03
616-23-9	SVOCs	dichloropropanol;2,3-			2.40E+01		5.30E+01								
542-75-6	VOCs	dichloropropene;1,3-			2.40E+02	4.40E-01	5.30E+02	4.40E+00				4.10E+04	3.40E+01	1.00E+05	8.50E+02
62-73-7	Pesticides	dichlorvos			4.00E+00	1.50E-01	8.80E+00	1.50E+00							
115-32-2	Pesticides	dicofol													
77-73-6	VOCs	dicyclopentadiene			6.40E+02		1.40E+03								
60-57-1	Pesticides	dieldrin			8.00E-01	5.50E-03	1.80E+00	5.50E-02				2.80E-02	8.70E-05	6.90E-02	2.20E-03
84-66-2	Phthalates	diethyl phthalate			1.30E+04		2.80E+04					2.80E+04		7.10E+04	
111-46-6	Glycols	diethylene glycol													
693-21-0	Glycols	diethylene glycol dinitrate													
112-34-5	Glycols	diethylene glycol monobutyl ether			2.40E+02		5.30E+02								
111-90-0	Glycols	diethylene glycol monoethyl ether			4.80E+02		1.10E+03								
617-84-5	SVOCs	diethylformamide			1.60E+01		3.50E+01								
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate													
56-53-1	SVOCs	diethylstilbesterol				2.50E-04		2.50E-03							
43222-48-6	Pesticides	difenzoquat			1.30E+03		2.80E+03								
35367-38-5	Pesticides	diflubenzuron			3.20E+02		7.00E+02								
75-37-6	VOCs	difluoroethane;1,1-													
1445-75-6	SVOCs	diisopropyl methylphosphonate			6.40E+02		1.40E+03								
55290-64-7	Pesticides	dimethipin			3.20E+02		7.00E+02								
60-51-5	Pesticides	dimethoate			3.20E+00		7.00E+00								
119-90-4	SVOCs	dimethoxybenzidine;3,3'-				5.50E-02		5.50E-01							
131-11-3	Phthalates	dimethyl phthalate													
120-61-6	Phthalates	dimethyl terephthalate			8.00E+02		1.80E+03								
124-40-3	VOCs	dimethylamine													
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-				1.50E-01		1.50E+00							
95-68-1	SVOCs	dimethylaniline;2,4-			1.60E+01	2.20E-01	3.50E+01	2.20E+00							
121-69-7	SVOCs	dimethylaniline;N,N-			1.60E+01	1.60E+00	3.50E+01	1.60E+01							
119-93-7	SVOCs	dimethylbenzidine;3,3'-				8.00E-03		8.00E-02							
68-12-2	VOCs	dimethylformamide;N,N-			8.00E+02		1.80E+03								
57-14-7	VOCs	dimethylhydrazine;1,1-			8.00E-01		1.80E+00								
540-73-8	VOCs	dimethylhydrazine;1,2-				8.00E-05		8.00E-04							
105-67-9	Phenols	dimethylphenol;2,4-			1.60E+02		3.50E+02					5.50E+02		1.40E+03	
576-26-1	Phenols	dimethylphenol;2,6-			4.80E+00		1.10E+01								
95-65-8	Phenols	dimethylphenol;3,4-			8.00E+00		1.80E+01								
99-65-0	Explosives	dinitrobenzene;m-			1.60E+00		3.50E+00								
528-29-0	SVOCs	dinitrobenzene;o-			1.60E+00		3.50E+00								
100-25-4	SVOCs	dinitrobenzene;p-			1.60E+00		3.50E+00								
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-			3.20E+01		7.00E+01								
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT		3.20E+01		7.00E+01					3.50E+03		8.60E+03	
25550-58-7	Phenols	dinitrophenols													
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-			1.40E+01	1.30E-01	3.20E+01	1.30E+00							
121-14-2	Explosives	dinitrotoluene;2,4-			3.20E+01	2.80E-01	7.00E+01	2.80E+00				1.40E+03	5.50E+00	3.40E+03	1.40E+02
606-20-2	Explosives	dinitrotoluene;2,6-			4.80E+00	5.80E-02	1.10E+01	5.80E-01							
117-84-0	Phthalates	di-n-octyl phthalate			1.60E+02		3.50E+02								
88-85-7	Herbicides	dinoseb			1.60E+01		3.50E+01		7.00E+00	7.00E+00	7.00E+00				
123-91-1	VOCs	dioxane;1,4-			2.40E+02	4.40E-01	5.30E+02	4.40E+00							
957-51-7	Pesticides	diphenamid			4.80E+02		1.10E+03								
122-39-4	SVOCs	diphenylamine			4.00E+02		8.80E+02					2.20E+03		5.40E+03	
122-66-7	SVOCs	diphenylhydrazine;1,2-				1.10E-01		1.10E+00					3.30E-01		8.10E+00
85-00-7	Pesticides	diquat			3.50E+01		7.70E+01		2.00E+01	2.00E+01	2.00E+01				
1937-37-7	Dyes	direct black 38				1.20E-02		1.20E-01							
2602-46-2	Dyes	direct blue 6				1.20E-02		1.20E-01							

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**Ground Water** Method A (µg/L)	**Ground Water** Method B Non cancer (µg/L)	**Ground Water** Method B Cancer (µg/L)	**Ground Water** Method C Non cancer (µg/L)	**Ground Water** Method C Cancer (µg/L)	**Ground Water** Maximum Contaminant Level Goal (µg/L)	**Ground Water** Federal Maximum Contaminant Level (µg/L)	**Ground Water** WA State Maximum Contaminant Level (µg/L)	**Surface Water** Method B Non cancer (µg/L)	**Surface Water** Method B Cancer (µg/L)	**Surface Water** Method C Non cancer (µg/L)	**Surface Water** Method C Cancer (µg/L)
16071-86-6	Dyes	direct brown 95				1.30E-02		1.30E-01							
2610-05-1	Dyes	direct sky blue													
298-04-4	Pesticides	disulfoton			6.40E-01		1.40E+00								
505-29-3	SVOCs	dithiane;1,4-			1.60E+02		3.50E+02								
330-54-1	Pesticides (Carbamate)	diuron			3.20E+01		7.00E+01								
534-52-1	Phenols	DNOC			1.30E+00		2.80E+00								
2439-10-3	Pesticides	dodine			6.40E+01		1.40E+02								
115-29-7	Pesticides	endosulfan			9.60E+01		2.10E+02					5.80E+01		1.40E+02	
1031-07-8	Pesticides	endosulfan sulfate			9.60E+01		2.10E+02								
959-98-8	Pesticides	endosulfan;alpha													
33213-65-9	Pesticides	endosulfan;beta													
145-73-3	Herbicides	endothall			3.20E+02		7.00E+02		1.00E+02	1.00E+02	1.00E+02				
72-20-8	Pesticides	endrin			4.80E+00		1.10E+01		2.00E+00	2.00E+00	2.00E+00	2.00E-01		4.90E-01	
7421-93-4	Pesticides	endrin aldehyde													
106-89-8	VOCs	epichlorohydrin			4.80E+01	4.40E+00	1.10E+02	4.40E+01	0.00E+00						
106-88-7	VOCs	epoxybutane													
16672-87-0	Pesticides	ethephon			8.00E+01		1.80E+02								
563-12-2	Pesticides	ethion			8.00E+00		1.80E+01								
111-15-9	VOCs	ethoxyethanol acetate;2-			8.00E+02		1.80E+03								
110-80-5	VOCs	ethoxyethanol;2-			7.20E+02		1.60E+03								
141-78-6	VOCs	ethyl acetate			7.20E+03		1.60E+04								
140-88-5	VOCs	ethyl acrylate			4.00E+01	9.10E-01	8.80E+01	9.10E+00							
75-00-3	VOCs	ethyl chloride													
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-			2.00E+02		4.40E+02								
60-29-7	VOCs	ethyl ether			1.60E+03		3.50E+03								
97-63-2	VOCs	ethyl methacrylate			7.20E+02		1.60E+03								
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate			1.60E-01		3.50E-01								
100-41-4	VOCs	ethylbenzene		7.00E+02	8.00E+02		1.80E+03		7.00E+02	7.00E+02	7.00E+02	6.90E+03		1.70E+04	
109-78-4	SVOCs	ethylene cyanohydrin			5.60E+02		1.20E+03								
107-15-3	SVOCs	ethylene diamine			7.20E+02		1.60E+03								
106-93-4	VOCs	ethylene dibromide (EDB)		1.00E-02	7.20E+01	2.20E-02	1.60E+02	2.20E-01	0.00E+00	5.00E-02	5.00E-02				
107-21-1	VOCs	ethylene glycol			1.60E+04		3.50E+04								
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)			8.00E+02		1.80E+03								
75-21-8	VOCs	ethylene oxide				1.40E-01		1.40E+00							
96-45-7	SVOCs	ethylene thiourea			1.30E+00	1.90E+00	2.80E+00	1.90E+01							
84-72-0	Phthalates	ethylphthalyl ethylglycolate			4.80E+04		1.10E+05								
101200-48-0	Pesticides	express			1.30E+02		2.80E+02								
22224-92-6	Pesticides	fenamiphos			4.00E+00		8.80E+00								
115-90-2	Pesticides	fensulfothion													
2164-17-2	Pesticides	fluometuron			2.10E+02		4.60E+02								
206-44-0	PAHs	fluoranthene			6.40E+02		1.40E+03					9.00E+01		2.30E+02	
86-73-7	PAHs	fluorene			6.40E+02		1.40E+03					3.50E+03		8.60E+03	
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES		9.60E+02		2.10E+03		4.00E+03	4.00E+03	4.00E+03				
59756-60-4	Pesticides	fluridone			1.30E+03		2.80E+03								
56425-91-3	Pesticides	flurprimidol			3.20E+02		7.00E+02								
66332-96-5	Pesticides	flutolanil			9.60E+02		2.10E+03								
69409-94-5	Pesticides	fluvalinate			1.60E+02		3.50E+02								
133-07-3	Pesticides	folpet			1.60E+03	2.50E+01	3.50E+03	2.50E+02							
72178-02-0	Pesticides	fomesafen				4.60E-01		4.60E+00							
944-22-9	Pesticides	fonofos			3.20E+01		7.00E+01								
50-00-0	VOCs	formaldehyde			1.60E+03	2.10E+00	3.50E+03	2.10E+01							
64-18-6	VOCs	formic acid			7.20E+03		1.60E+04								
39148-24-8	Pesticides	fosetyl-al			4.80E+04		1.10E+05								
110-00-9	Furans	furan			8.00E+00		1.80E+01								

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67-45-8	SVOCs	furazolidone				2.30E-02		2.30E-01							
98-01-1	VOCs	furfural			2.40E+01		5.30E+01								
531-82-8	SVOCs	furium				5.80E-02		5.80E-01							
60568-05-0	Pesticides	furmecyclox				2.90E+00		2.90E+01							
77182-82-2	SVOCs	glufosinate-ammonium			6.40E+00		1.40E+01								
765-34-4	VOCs	glycidaldehyde			3.20E+00		7.00E+00								
1071-83-6	SVOCs	glyphosate			1.60E+03		3.50E+03		7.00E+02	7.00E+02	7.00E+02				
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE	1.50E+01					0.00E+00	1.50E+01	1.50E+01				
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE	4.00E+00					0.00E+00	4.00E+00	4.00E+00				
86-50-0	Pesticides	guthion			4.80E+01		1.10E+02								
69806-40-2	Pesticides	haloxyfop-methyl			8.00E-01		1.80E+00								
79277-27-3	Pesticides	harmony			2.10E+02		4.60E+02								
76-44-8	Pesticides	heptachlor			8.00E+00	1.90E-02	1.80E+01	1.90E-01	0.00E+00	4.00E-01	4.00E-01	1.20E-01	1.30E-04	2.90E-01	3.20E-03
1024-57-3	Pesticides	heptachlor epoxide			1.00E-01	4.80E-03	2.30E-01	4.80E-02	0.00E+00	2.00E-01	2.00E-01	3.00E-03	6.40E-05	7.50E-03	1.60E-03
142-82-5	VOCs	heptane;n-			2.40E+00		5.30E+00								
87-82-1	SVOCs	hexabromobenzene			3.20E+01		7.00E+01								
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-			3.20E+00		7.00E+00								
118-74-1	Pesticides	hexachlorobenzene			1.30E+01	5.50E-02	2.80E+01	5.50E-01	0.00E+00	1.00E+00	1.00E+00	2.40E-01	4.70E-04	6.00E-01	1.20E-02
87-68-3	VOCs	hexachlorobutadiene			8.00E+00	5.60E-01	1.80E+01	5.60E+00				9.30E+02	3.00E+01	2.30E+03	7.50E+02
319-84-6	Pesticides	hexachlorocyclohexane;alpha			1.30E+02	1.40E-02	2.80E+02	1.40E-01				1.60E+02	7.90E-03	4.00E+02	2.00E-01
319-85-7	Pesticides	hexachlorocyclohexane;beta-				4.90E-02		4.90E-01					2.80E-02		6.90E-01
319-86-8	Pesticides	hexachlorocyclohexane;delta-													
608-73-1	SVOCs	hexachlorocyclohexane;technical				4.90E-02		4.90E-01							
77-47-4	Pesticides	hexachlorocyclopentadiene			4.80E+01		1.10E+02		5.00E+01	5.00E+01	5.00E+01	3.60E+03		9.00E+03	
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture				1.40E-05		1.40E-04							
67-72-1	VOCs	hexachloroethane			5.60E+00	1.10E+00	1.20E+01	1.10E+01				2.10E+01	1.90E+00	5.20E+01	4.70E+01
70-30-4	SVOCs	hexachlorophene			4.80E+00		1.10E+01								
822-06-0	VOCs	hexamethylene diisocyanate;1,6-													
110-54-3	VOCs	hexane;n-			4.80E+02		1.10E+03								
591-78-6	VOCs	hexanone;2-			4.00E+01		8.80E+01								
51235-04-2	Pesticides	hexazinone			5.30E+02		1.20E+03								
302-01-2	VOCs	hydrazine				1.50E-02		1.50E-01							
10034-93-2	SVOCs	hydrazine sulfate				2.90E-02		2.90E-01							
7647-01-0	VOCs	hydrogen chloride													
74-90-8	Cyanides	hydrogen cyanide			4.80E+00		1.10E+01								
7783-06-4	VOCs	hydrogen sulfide													
123-31-9	SVOCs	hydroquinone			6.40E+02	1.50E+00	1.40E+03	1.50E+01							
35554-44-0	Pesticides	imazalil			2.10E+02		4.60E+02								
81335-37-7	Pesticides	imazaquin			4.00E+03		8.80E+03								
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES												
36734-19-7	Pesticides	iprodione			6.40E+02		1.40E+03								
7439-89-6	Metals	iron			1.10E+04		2.50E+04								
78-83-1	VOCs	isobutyl alcohol			2.40E+03		5.30E+03								
78-59-1	SVOCs	isophorone			1.60E+03	4.60E+01	3.50E+03	4.60E+02				1.20E+05	1.60E+03	3.00E+05	3.90E+04
33820-53-0	Pesticides	isopropalin			2.40E+02		5.30E+02								
1832-54-8	SVOCs	isopropyl methyl phosphonic acid			1.60E+03		3.50E+03								
82558-50-7	Pesticides	isoxaben			8.00E+02		1.80E+03								
77501-63-4	Pesticides	lactofen			3.20E+01		7.00E+01								
7439-92-1	Metals	LEAD	LEAD NOTES	1.50E+01					0.00E+00	1.50E+01	1.50E+01				
unavailable02	Metals	lead alkyls													
58-89-9	Pesticides	lindane		2.00E-01	4.80E+00	8.00E-02	1.10E+01	8.00E-01	2.00E-01	2.00E-01	2.00E-01	6.00E+00	4.50E-02	1.50E+01	1.10E+00
330-55-2	Pesticides (Carbamate)	linuron			3.20E+01		7.00E+01								
7791-03-9	Perchlorates	lithium perchlorate			1.10E+01		2.50E+01								
83055-99-6	Pesticides	londax			3.20E+03		7.00E+03								

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121-75-5	Pesticides	malathion			3.20E+02		7.00E+02								
108-31-6	SVOCs	maleic anhydride			8.00E+02		1.80E+03								
123-33-1	SVOCs	maleic hydrazide			8.00E+03		1.80E+04								
109-77-3	VOCs	malononitrile			8.00E-01		1.80E+00								
8018-01-7	Pesticides	mancozeb			4.80E+02		1.10E+03								
12427-38-2	Pesticides	maneb			8.00E+01		1.80E+02								
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES												
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES		7.50E+02		1.60E+03								
950-10-7	Pesticides	mephosfolan			1.40E+00		3.20E+00								
24307-26-4	Pesticides	mepiquat chloride			4.80E+02		1.10E+03								
7487-94-7	Metals	mercuric chloride			4.80E+00		1.10E+01								
7439-97-6	Metals	mercury		2.00E+00					2.00E+00	2.00E+00	2.00E+00				
150-50-5	Pesticides	merphos			4.80E-01		1.10E+00								
57837-19-1	Pesticides	metalaxyl			9.60E+02		2.10E+03								
126-98-7	VOCs	methacrylonitrile			8.00E-01		1.80E+00								
10265-92-6	Pesticides	methamidosphos			8.00E-01		1.80E+00								
67-56-1	VOCs	methanol			1.60E+04		3.50E+04								
950-37-8	Pesticides	methidathion			1.60E+01		3.50E+01								
16752-77-5	Pesticides (Carbamate)	methomyl			4.00E+02		8.80E+02								
99-59-2	SVOCs	methoxy-5-nitroaniline;2-				1.80E+00		1.80E+01							
72-43-5	Pesticides	methoxychlor			8.00E+01		1.80E+02		4.00E+01	4.00E+01	4.00E+01	8.40E+00		2.10E+01	
110-49-6	VOCs	methoxyethanol acetate;2-			6.40E+01		1.40E+02								
109-86-4	VOCs	methoxyethanol;2-			4.00E+01		8.80E+01								
79-20-9	VOCs	methyl acetate			8.00E+03		1.80E+04								
96-33-3	VOCs	methyl acrylate			2.40E+02		5.30E+02								
78-93-3	VOCs	methyl ethyl ketone			4.80E+03		1.10E+04								
108-10-1	VOCs	methyl isobutyl ketone			6.40E+02		1.40E+03								
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES		1.60E+00		3.50E+00								
80-62-6	VOCs	methyl methacrylate			1.10E+04		2.50E+04								
90-12-0	PAHs	methyl naphthalene;1-			5.60E+02	1.50E+00	1.20E+03	1.50E+01							
91-57-6	PAHs	methyl naphthalene;2-			3.20E+01		7.00E+01								
298-00-0	Pesticides	methyl parathion			4.00E+00		8.80E+00								
25013-15-4	VOCs	methyl styrene			4.80E+01		1.10E+02								
98-83-9	SVOCs	methyl styrene, alpha			5.60E+02		1.20E+03								
1634-04-4	VOCs	methyl tert-butyl ether		2.00E+01		2.40E+01		2.40E+02							
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-			8.00E+00		1.80E+01								
99-55-8	SVOCs	methyl-5-nitroaniline;2-			3.20E+02	9.70E+00	7.00E+02	9.70E+01							
636-21-5	SVOCs	methylaniline hydrochloride;2-				6.70E-01		6.70E+00							
95-53-4	VOCs	methylaniline;2-				2.70E+00		2.70E+01							
108-87-2	VOCs	methylcyclohexane													
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-			3.20E+01	8.80E-01	7.00E+01	8.80E+00							
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-				1.90E+00		1.90E+01							
74-95-3	VOCs	methylene bromide			8.00E+01		1.80E+02								
75-09-2	VOCs	methylene chloride		5.00E+00	4.80E+01	2.20E+01	1.10E+02	2.20E+02	0.00E+00	5.00E+00	5.00E+00	1.70E+04	3.60E+03	4.30E+04	9.00E+04
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)													
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)													
101-77-9	SVOCs	methylenebisbenzenamine;4,4-				5.50E-02		5.50E-01							
60-34-4	VOCs	methylhydrazine			8.00E+00		1.80E+01								
51218-45-2	Pesticides	metolachlor			2.40E+03		5.30E+03								
21087-64-9	Pesticides	metribuzin			4.00E+02		8.80E+02								
7786-34-7	Pesticides	mevinphos													
2385-85-5	Pesticides	mirex			3.20E+00	4.90E-03	7.00E+00	4.90E-02							
2212-67-1	Pesticides	molinate			3.20E+01		7.00E+01								
7439-98-7	Metals	molybdenum			8.00E+01		1.80E+02								

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10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS		1.60E+03		3.50E+03		4.00E+03	4.00E+03	4.00E+03				
unavailable03	SVOCs	monochlorobutanes (not in HSDB)													
300-76-5	Pesticides	naled			3.20E+01		7.00E+01								
91-20-3	PAHs	naphthalene		1.60E+02	1.60E+02		3.50E+02					4.90E+03		1.20E+04	
15299-99-7	Pesticides	napropamide			1.60E+03		3.50E+03								
104-51-8	VOCs	n-butylbenzene			4.00E+02		8.80E+02								
2429-74-5	Dyes	niagara blue 4B													
unavailable04	Metals	nickel refinery dust			1.80E+02		3.90E+02								
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT		3.20E+02		7.00E+02				1.00E+02	1.10E+03		2.80E+03	
12035-72-2	Metals	nickel subsulfide			1.80E+02	5.10E-02	3.90E+02	5.10E-01							
14797-55-8	Nutrients	nitrate			2.60E+04		5.60E+04		1.00E+04	1.00E+04	1.00E+04				
10102-43-9	Gases	nitric oxide													
14797-65-0	Nutrients	nitrite			1.60E+03		3.50E+03		1.00E+03	1.00E+03	1.00E+03				
88-74-4	SVOCs	nitroaniline, 2-			1.60E+02		3.50E+02								
100-01-6	SVOCs	nitroaniline, 4-			6.40E+01		1.40E+02								
98-95-3	Explosives	nitrobenzene			1.60E+01		3.50E+01					1.80E+03		4.50E+03	
67-20-9	SVOCs	nitrofurantoin			1.10E+03		2.50E+03								
59-87-0	SVOCs	nitrofurazone				6.70E-02		6.70E-01							
10102-44-0	Gases	nitrogen dioxide													
556-88-7	SVOCs	nitroguanidine			1.60E+03		3.50E+03								
79-46-9	VOCs	nitropropane;2-													
1116-54-7	SVOCs	nitrosodiethanolamine;N-				3.10E-02		3.10E-01							
55-18-5	SVOCs	nitrosodiethylamine;N-				2.90E-04		2.90E-03							
62-75-9	SVOCs	nitrosodimethylamine;N-			6.40E-02	8.60E-04	1.40E-01	8.60E-03				8.00E+02	4.90E+00	2.00E+03	1.20E+02
924-16-3	VOCs	nitroso-di-n-butylamine;N-				8.10E-03		8.10E-02							
621-64-7	SVOCs	nitroso-di-n-propylamine;N-				1.30E-02		1.30E-01					8.20E-01		2.00E+01
86-30-6	SVOCs	nitrosodiphenylamine;N-				1.80E+01		1.80E+02					9.70E+00		2.40E+02
4549-40-0	SVOCs	nitrosomethylvinylamine,n-													
759-73-9	SVOCs	nitroso-n-ethylurea;n-				3.20E-03		3.20E-02							
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-				4.00E-03		4.00E-02							
684-93-5	SVOCs	nitroso-n-methylurea,n-				7.30E-04		7.30E-03							
930-55-2	SVOCs	nitrosopyrrolidine;N-				2.10E-02		2.10E-01							
99-08-1	Explosives	nitrotoluene, m-			8.00E-01		1.80E+00								
88-72-2	Explosives	nitrotoluene, o-			7.20E+00	2.00E-01	1.60E+01	2.00E+00							
99-99-0	Explosives	nitrotoluene, p-			3.20E+01	2.70E+00	7.00E+01	2.70E+01							
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-													
84852-15-3	Phenols	nonylphenol													
27314-13-2	Pesticides	norflurazon			6.40E+02		1.40E+03								
85509-19-9	Herbicides	nustar			1.10E+01		2.50E+01								
32536-52-0	PBDEs	octabromodiphenyl ether			4.80E+01		1.10E+02					2.40E+03		6.10E+03	
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine			8.00E+02		1.80E+03								
152-16-9	SVOCs	octamethylpyrophosphoramide			3.20E+01		7.00E+01								
19044-88-3	Pesticides	oryzalin			8.00E+02		1.80E+03								
19666-30-9	Pesticides	oxadiazon			8.00E+01		1.80E+02								
23135-22-0	Pesticides (Carbamate)	oxamyl			4.00E+02		8.80E+02		2.00E+02	2.00E+02	2.00E+02				
42874-03-3	Pesticides	oxyfluorfen			4.80E+01		1.10E+02								
76738-62-0	Herbicides	paclobutrazol			2.10E+02		4.60E+02								
unavailable05	PAHs	PAHs	PAH NOTES												
4685-14-7	Pesticides	paraquat													
56-38-2	Pesticides	parathion			9.60E+01		2.10E+02								
1114-71-2	Pesticides	pebulate			4.00E+02		8.80E+02								
40487-42-1	Pesticides	pendimethalin			6.40E+02		1.40E+03								
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-			3.20E+02	3.80E+00	7.00E+02	3.80E+01							
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-			1.60E+00		3.50E+00					3.20E-02		8.00E-02	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
32534-81-9	PBDEs	pentabromodiphenyl ethers			3.20E+01		7.00E+01								
608-93-5	SVOCs	pentachlorobenzene			1.30E+01		2.80E+01								
82-68-8	Pesticides	pentachloronitrobenzene			4.80E+01	3.40E-01	1.10E+02	3.40E+00							
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT		8.00E+01	2.20E-01	1.80E+02	2.20E+00	0.00E+00	1.00E+00	1.00E+00	1.20E+03	1.50E+00	2.90E+03	3.70E+01
14797-73-0	Perchlorates	perchlorate and perchlorate salts			1.10E+01		2.50E+01								
52645-53-1	Pesticides	permethrin			8.00E+02		1.80E+03								
72-56-0	Pesticides	perthane													
unavailable19	General Chemistry	pH	pH NOTES												
85-01-8	PAHs	phenanthrene													
13684-63-4	Pesticides	phenmedipham			4.00E+03		8.80E+03								
108-95-2	Phenols	phenol			2.40E+03		5.30E+03					5.60E+05		1.40E+06	
106-50-3	SVOCs	phenylenediamine, p-			3.00E+03		6.70E+03								
108-45-2	SVOCs	phenylenediamine;m-			9.60E+01		2.10E+02								
95-54-5	SVOCs	phenylenediamine;o-			6.40E+01	1.90E+00	1.40E+02	1.90E+01							
62-38-4	Metals (organometallic)	phenylmercuric acetate			1.30E+00		2.80E+00								
90-43-7	Phenols	phenylphenol;2-				4.60E+01		4.60E+02							
298-02-2	Pesticides	phorate			3.20E+00		7.00E+00								
75-44-5	VOCs	phosgene													
732-11-6	Pesticides	phosmet			3.20E+02		7.00E+02								
7803-51-2	Gases	phosphine			2.40E+00		5.30E+00								
7664-38-2	SVOCs	phosphoric acid			3.90E+05		8.60E+05								
7723-14-0	Metals	phosphorus			1.60E-01		3.50E-01								
100-21-0	Phthalates	phthalic acid;p-			1.60E+04		3.50E+04								
85-44-9	Phthalates	phthalic anhydride			3.20E+04		7.00E+04								
1918-02-1	Herbicides	picloram			1.10E+03		2.50E+03		5.00E+02	5.00E+02	5.00E+02				
29232-93-7	Pesticides	pirimiphos-methyl			1.60E+02		3.50E+02								
59536-65-1	PBBs	polybrominated biphenyls			1.10E-01	2.90E-03	2.50E-01	2.90E-02							
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)		1.00E-01		4.40E-02		4.40E-01	0.00E+00	5.00E-01	5.00E-01		1.00E-04		2.60E-03
151-50-8	Cyanides	potassium cyanide			3.20E+01		7.00E+01								
7778-74-7	Perchlorates	potassium perchlorate			1.10E+01		2.50E+01								
506-61-6	Cyanides	potassium silver cyanide			8.00E+01		1.80E+02								
67747-09-5	Pesticides	prochloraz (not in HSDB)			1.40E+02	5.80E-01	3.20E+02	5.80E+00							
26399-36-0	Pesticides	profluralin			9.60E+01		2.10E+02								
1610-18-0	Pesticides	prometon			2.40E+02		5.30E+02								
7287-19-6	Pesticides	prometryn			6.40E+01		1.40E+02								
23950-58-5	Pesticides	pronamide			1.20E+03		2.60E+03								
1918-16-7	Pesticides	propachlor			2.10E+02		4.60E+02								
709-98-8	Pesticides	propanil			8.00E+01		1.80E+02								
2312-35-8	Pesticides	propargite			1.60E+02		3.50E+02								
107-19-7	VOCs	propargyl alcohol			1.60E+01		3.50E+01								
139-40-2	Pesticides	propazine			3.20E+02		7.00E+02								
122-42-9	Pesticides	propham			3.20E+02		7.00E+02								
60207-90-1	Pesticides	propiconazole			2.10E+02		4.60E+02								
123-38-6	VOCs	propionaldehyde													
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-			1.60E+01		3.50E+01								
103-65-1	VOCs	propylbenzene;n-			8.00E+02		1.80E+03								
57-55-6	Glycols	propylene glycol			1.60E+05		3.50E+05								
6423-43-4	Glycols	propylene glycol dinitrate;1,2-													
52125-53-8	Glycols	propylene glycol monoethyl ether			5.60E+03		1.20E+04								
107-98-2	Glycols	propylene glycol monomethyl ether			5.60E+03		1.20E+04								
75-56-9	VOCs	propylene oxide				1.80E-01		1.80E+00							
81335-77-5	Pesticides	pursuit			4.00E+03		8.80E+03								
51630-58-1	Pesticides	pydrin			4.00E+02		8.80E+02								
129-00-0	PAHs	pyrene			4.80E+02		1.10E+03					2.60E+03		6.50E+03	

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
110-86-1	VOCs	pyridine			8.00E+00		1.80E+01								
13593-03-8	Pesticides	quinalphos			8.00E+00		1.80E+01								
91-22-5	SVOCs	quinoline				1.50E-02		1.50E-01							
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE	3.00E+00											
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES	5.00E+00					0.00E+00	5.00E+00	5.00E+00				
121-82-4	Explosives	rdx			6.40E+01	1.10E+00	1.40E+02	1.10E+01							
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE												
10453-86-8	Pesticides	resmethrin			4.80E+02		1.10E+03								
299-84-3	Pesticides	ronnel			8.00E+02		1.80E+03								
83-79-4	Pesticides	rotenone			6.40E+01		1.40E+02								
78-48-8	Pesticides	s,s,s-tributylphosphorotrithioate			4.80E-01		1.10E+00								
78587-05-0	Pesticides	savey			4.00E+02		8.80E+02								
135-98-8	VOCs	sec-butylbenzene			8.00E+02		1.80E+03								
7783-00-8	Metals	selenious acid			8.00E+01		1.80E+02								
7782-49-2	Metals	selenium and compounds			8.00E+01		1.80E+02		5.00E+01	5.00E+01	5.00E+01	2.70E+03		6.80E+03	
630-10-4	Metals (organometallic)	selenourea													
74051-80-2	Pesticides	sethoxydim			1.40E+03		3.20E+03								
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT		8.00E+01		1.80E+02					2.60E+04		6.50E+04	
506-64-9	Cyanides	silver cyanide			1.60E+03		3.50E+03								
122-34-9	Pesticides	simazine			8.00E+01	7.30E-01	1.80E+02	7.30E+00	4.00E+00	4.00E+00	4.00E+00				
26628-22-8	Metals	sodium azide			3.20E+01		7.00E+01								
143-33-9	Cyanides	sodium cyanide			1.60E+01		3.50E+01								
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate			4.80E+02	3.20E-01	1.10E+03	3.20E+00							
62-74-8	Metals (organometallic)	sodium fluoroacetate			3.20E-01		7.00E-01								
13718-26-8	Metals	sodium metavanadate			1.60E+01		3.50E+01								
7601-89-0	Perchlorates	sodium perchlorate			1.10E+01		2.50E+01								
7440-24-6	Metals	strontium			9.60E+03		2.10E+04								
57-24-9	SVOCs	strychnine			4.80E+00		1.10E+01								
100-42-5	VOCs	styrene			1.60E+03		3.50E+03		1.00E+02	1.00E+02	1.00E+02				
unavailable17	Metals	sulfate													
88671-89-0	Pesticides	systhane			4.00E+02		8.80E+02								
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES		1.10E-05	6.70E-07	2.50E-05	6.70E-06	0.00E+00	3.00E-05	3.00E-05	3.60E-07	1.00E-08	9.10E-07	2.50E-07
34014-18-1	Pesticides	tebuthiuron			1.10E+03		2.50E+03								
3383-96-8	Pesticides	temephos			3.20E+02		7.00E+02								
5902-51-2	Pesticides	terbacil			2.10E+02		4.60E+02								
13071-79-9	SVOCs	terbufos			4.00E-01		8.80E-01								
886-50-0	Pesticides	terbutryn			1.60E+01		3.50E+01								
98-06-6	VOCs	tert-butylbenzene			8.00E+02		1.80E+03								
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'			1.60E+00		3.50E+00								
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-			4.80E+00		1.10E+01								
630-20-6	VOCs	tetrachloroethane;1,1,1,2-			2.40E+02	1.70E+00	5.30E+02	1.70E+01							
79-34-5	VOCs	tetrachloroethane;1,1,2,2-			1.60E+02	2.20E-01	3.50E+02	2.20E+00				1.00E+04	6.50E+00	2.60E+04	1.60E+02
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES	5.00E+00	4.80E+01	2.10E+01	1.10E+02	2.10E+02	0.00E+00	5.00E+00	5.00E+00	5.00E+02	1.00E+02	1.30E+03	2.50E+03
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT		4.80E+02		1.10E+03								
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-				4.40E-03		4.40E-02							
961-11-5	Pesticides	tetrachlorvinphos			4.80E+02	3.60E+00	1.10E+03	3.60E+01							
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate			8.00E+00		1.80E+01								
78-00-2	Metals (organometallic)	tetraethyl lead			8.00E-04		1.80E-03								
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-													
109-99-9	Furans	tetrahydrofuran			7.20E+03		1.60E+04								
1314-32-5	Metals	thallic oxide			3.20E-01		7.00E-01								
563-68-8	Metals	thallium acetate			1.60E-01		3.50E-01								
6533-73-9	Metals	thallium carbonate			3.20E-01		7.00E-01								
7791-12-0	Metals	thallium chloride			1.60E-01		3.50E-01								

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10102-45-1	Metals	thallium nitrate			1.60E-01		3.50E-01								
12039-52-0	Metals	thallium selenite			1.60E-01		3.50E-01								
7446-18-6	Metals	thallium(I) sulfate			3.20E-01		7.00E-01								
7440-28-0	Metals	thallium, soluble salts			1.60E-01		3.50E-01		5.00E-01	2.00E+00	2.00E+00	2.20E-01		5.60E-01	
28249-77-6	Pesticides	thiobencarb			1.60E+02		3.50E+02								
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-			4.80E+02		1.10E+03								
39196-18-4	Pesticides	thiofanox			4.80E+00		1.10E+01								
23564-05-8	Pesticides	thiophanate-methyl			1.30E+03		2.80E+03								
137-26-8	Pesticides	thiram			4.00E+01		8.80E+01								
7440-31-5	Metals	tin			9.60E+03		2.10E+04								
118-96-7	Explosives	tnt			8.00E+00	2.90E+00	1.80E+01	2.90E+01							
108-88-3	VOCs	toluene		1.00E+03	6.40E+02		1.40E+03		1.00E+03	1.00E+03	1.00E+03	1.90E+04		4.80E+04	
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-				1.10E+00		1.10E+01							
584-84-9	VOCs	toluene-2,4-diisocyanate				1.10E+00		1.10E+01							
91-08-7	VOCs	toluene-2,6-diisocyanate				1.10E+00		1.10E+01							
95-80-7	SVOCs	toluenediamine;2,4-													
95-70-5	SVOCs	toluenediamine;2,5-			3.20E+00	4.90E-01	7.00E+00	4.90E+00							
823-40-5	SVOCs	toluenediamine;2,6-													
106-49-0	SVOCs	toluidine;p-			3.20E+01	1.50E+00	7.00E+01	1.50E+01							
unavailable18	General Chemistry	total dissolved solids													
8001-35-2	Pesticides	toxaphene			1.40E+00	8.00E-02	3.20E+00	8.00E-01	0.00E+00	3.00E+00	3.00E+00	1.80E-02	4.50E-04	4.50E-02	1.10E-02
93-72-1	Herbicides	tp;2,4,5-			1.30E+02		2.80E+02		5.00E+01	5.00E+01	5.00E+01				
unavailable09	Petroleum	tph, diesel range organics		5.00E+02											
unavailable10	Petroleum	tph, heavy oils		5.00E+02											
unavailable11	Petroleum	tph, mineral oils		5.00E+02											
unavailable25	Petroleum	tph: gasoline range organics, benzene present		8.00E+02											
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene		1.00E+03											
66841-25-6	Pesticides	tralomethrin			1.20E+02		2.60E+02								
2303-17-5	Pesticides	triallate			2.10E+02		4.60E+02								
82097-50-5	Pesticides	triasulfuron			1.60E+02		3.50E+02								
615-54-3	VOCs	tribromobenzene;1,2,4-			8.00E+01		1.80E+02								
688-73-3	Organotins	tributyltin													
56-35-9	Organotins	tributyltin oxide			4.80E+00		1.10E+01								
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS						4.00E+03	4.00E+03	4.00E+03				
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-			2.40E+05		5.30E+05								
76-03-9	SVOCs	trichloroacetic acid			3.20E+02	1.30E+00	7.00E+02	1.30E+01	2.00E+01	6.00E+01	6.00E+01				
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-				3.00E+00		3.00E+01							
634-93-5	SVOCs	trichloroaniline;2,4,6-			4.80E-01	1.30E+01	1.10E+00	1.30E+02							
120-82-1	VOCs	trichlorobenzene;1,2,4-			8.00E+01	1.50E+00	1.80E+02	1.50E+01	7.00E+01	7.00E+01	7.00E+01	2.30E+02	2.00E+00	5.70E+02	4.90E+01
71-55-6	VOCs	trichloroethane;1,1,1-		2.00E+02	1.60E+04		3.50E+04		2.00E+02	2.00E+02	2.00E+02	9.30E+05		2.30E+06	
79-00-5	VOCs	trichloroethane;1,1,2-			3.20E+01	7.70E-01	7.00E+01	7.70E+00	3.00E+00	5.00E+00	5.00E+00	2.30E+03	2.50E+01	5.80E+03	6.30E+02
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES	5.00E+00	4.00E+00	5.40E-01	8.80E+00	9.40E+00	0.00E+00	5.00E+00	5.00E+00	1.20E+02	1.30E+01	2.90E+02	3.20E+02
75-69-4	VOCs	trichlorofluoromethane			2.40E+03		5.30E+03								
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT		8.00E+02		1.80E+03								
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT		8.00E+00	4.00E+00	1.80E+01	4.00E+01				1.70E+01	3.90E+00	4.30E+01	9.80E+01
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-			1.60E+02		3.50E+02								
598-77-6	VOCs	trichloropropane;1,1,2-			4.00E+01		8.80E+01								
96-18-4	VOCs	trichloropropane;1,2,3-			3.20E+01	1.50E-03	7.00E+01	1.50E-02							
96-19-5	VOCs	trichloropropene;1,2,3-			2.40E+01		5.30E+01								
58138-08-2	Pesticides	tridiphane			4.80E+01		1.10E+02								
121-44-8	VOCs	triethylamine													
1582-09-8	Pesticides	trifluralin			1.20E+02	1.10E+01	2.60E+02	1.10E+02							
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES							8.00E+01	8.00E+01				
512-56-1	SVOCs	trimethyl phosphate			8.00E+01	2.20E+00	1.80E+02	2.20E+01							
526-73-8	VOCs	trimethylbenzene;1,2,3-			8.00E+01		1.80E+02								
95-63-6	VOCs	trimethylbenzene;1,2,4-			8.00E+01		1.80E+02								
108-67-8	VOCs	trimethylbenzene;1,3,5-			8.00E+01		1.80E+02								

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Ground Water Method A (µg/L)	Ground Water Method B Non cancer (µg/L)	Ground Water Method B Cancer (µg/L)	Ground Water Method C Non cancer (µg/L)	Ground Water Method C Cancer (µg/L)	Ground Water Maximum Contaminant Level Goal (µg/L)	Ground Water Federal Maximum Contaminant Level (µg/L)	Ground Water WA State Maximum Contaminant Level (µg/L)	Surface Water Method B Non cancer (µg/L)	Surface Water Method B Cancer (µg/L)	Surface Water Method C Non cancer (µg/L)	Surface Water Method C Cancer (µg/L)
99-35-4	Explosives	trinitrobenzene;1,3,5-			4.80E+02		1.10E+03								
479-45-8	Explosives	trinitrophenylmethylnitramine			1.60E+01		3.50E+01								
unavailable12	Radionuclides	uranium, soluble salts			4.80E+01		1.10E+02		0.00E+00	3.00E+01	3.00E+01				
7440-62-2	Metals	vanadium			8.00E+01		1.80E+02								
1314-62-1	Metals	vanadium pentoxide			1.40E+02		3.20E+02								
27774-13-6	Metals	vanadyl sulfate													
1929-77-7	Pesticides	vernam			8.00E+00		1.80E+01								
50471-44-8	Pesticides	vinclozolin			4.00E+02		8.80E+02								
108-05-4	VOCs	vinyl acetate			8.00E+03		1.80E+04								
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES	2.00E-01	2.40E+01	2.90E-02	5.30E+01	2.90E-01	0.00E+00	2.00E+00	2.00E+00	6.60E+03	3.70E+00	1.70E+04	9.20E+01
81-81-2	Pesticides	warfarin			2.40E+00		5.30E+00								
8012-95-1	Petroleum	white mineral oil			4.80E+04		1.10E+05								
108-38-3	VOCs	xylene;m-			1.60E+03		3.50E+03								
95-47-6	VOCs	xylene;o-			1.60E+03		3.50E+03								
106-42-3	VOCs	xylene;p-			1.60E+03		3.50E+03								
1330-20-7	VOCs	xylenes		1.00E+03	1.60E+03		3.50E+03		1.00E+04	1.00E+04	1.00E+04				
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT		4.80E+03		1.10E+04					1.70E+04		4.10E+04	
557-21-1	Cyanides	zinc cyanide			8.00E+02		1.80E+03								
1314-84-7	Metals	zinc phosphide			4.80E+00		1.10E+01								
12122-67-7	Pesticides	zineb			8.00E+02		1.80E+03								

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83-32-9	PAHs	acenaphthene						1.10E+02	3.00E+01	7.00E+01				
208-96-8	PAHs	acenaphthylene												
30560-19-1	Pesticides	acephate												
75-07-0	VOCs	acetaldehyde												
34256-82-1	Pesticides	acetochlor												
67-64-1	VOCs	acetone												
75-86-5	VOCs	acetone cyanohydrin												
75-05-8	VOCs	acetonitrile												
98-86-2	SVOCs	acetophenone												
62476-59-9	Herbicides	acifluorfen, sodium												
107-02-8	VOCs	acrolein			3.00E+00		3.00E+00	1.00E+00		3.00E+00				
79-06-1	VOCs	acrylamide												
79-10-7	VOCs	acrylic acid												
107-13-1	VOCs	acrylonitrile						1.90E-02		6.10E-02				
15972-60-8	Pesticides	alachlor												
1596-84-5	Pesticides	alar												
116-06-3	Pesticides (Carbamate)	aldicarb												
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone												
309-00-2	Pesticides	aldrin		2.50E+00	3.00E+00	1.90E-03		5.70E-06	4.10E-08	7.70E-07	7.10E-01	1.30E+00	1.90E-03	
74223-64-6	Pesticides	ally												
107-18-6	VOCs	allyl alcohol												
107-05-1	VOCs	allyl chloride												
7429-90-5	Metals	aluminum												
20859-73-8	Metals	aluminum phosphide												
67485-29-4	Pesticides	amdro												
834-12-8	Pesticides	ametryn												
591-27-5	Phenols	aminophenol;m-												
504-24-5	SVOCs	aminopyridine;4-												
33089-61-1	Pesticides	amitraz												
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES								2.30E+02		3.50E+01	
7790-98-9	Perchlorates	ammonium perchlorate												
7773-06-0	Pesticides	ammonium sulfamate												
62-53-3	SVOCs	aniline												
120-12-7	PAHs	anthracene						3.10E+03	1.00E+02	3.00E+02				
7440-36-0	Metals	antimony						1.20E+01	6.00E+00	5.60E+00				
1314-60-9	Metals	antimony pentoxide												
28300-74-5	Metals	antimony potassium tartrate												
1332-81-6	Metals	antimony tetroxide												
1309-64-4	Metals	antimony trioxide												
74115-24-5	Pesticides	apollo												
140-57-8	SVOCs	aramite												
12674-11-2	PCBs	aroclor 1016												
11097-69-1	PCBs	aroclor 1254												
11096-82-5	PCBs	aroclor 1260												
7440-38-2	Metals	arsenic, inorganic		3.60E+02	3.40E+02	1.90E+02	1.50E+02	1.00E+01	1.80E-02	1.80E-02	6.90E+01	6.90E+01	3.60E+01	3.60E+01
7784-42-1	Metals	arsine												
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE					7.00E+06		7.00E+06				
76578-14-8	Pesticides	assure												
3337-71-1	Pesticides	asulam												
1912-24-9	Pesticides	atrazine												
65195-55-3	Pesticides	avermectin B1												
103-33-3	Pesticides	azobenzene												
7440-39-3	Metals	barium and compounds								1.00E+03				
542-62-1	Metals	barium cyanide												

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114-26-1	Pesticides	baygon												
43121-43-3	Pesticides	bayleton												
68359-37-5	Pesticides	baythroid												
1861-40-1	Pesticides	benefin												
17804-35-2	Pesticides	benomyl												
25057-89-0	Herbicides	bentazon												
100-52-7	SVOCs	benzaldehyde												
71-43-2	VOCs	BENZENE						4.40E-01		5.80E-01				
108-98-5	SVOCs	benzenethiol												
92-87-5	SVOCs	benzidine						2.00E-05		1.40E-04				
191-24-2	PAHs	benzo(g,h,i)perylene												
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES					1.40E-02	1.60E-04	1.20E-03				
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES					1.40E-03	1.60E-05	1.20E-04				
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES					1.40E-02	1.60E-04	1.20E-03				
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES					1.40E-02	1.60E-03	1.20E-02				
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT											
98-07-7	VOCs	benzotrichloride												
100-51-6	SVOCs	benzyl alcohol												
100-44-7	VOCs	benzyl chloride												
7440-41-7	Metals	beryllium												
91-58-7	PAHs	beta-chloronaphthalene						1.70E+02	1.00E+02	8.00E+02				
141-66-2	SVOCs	bidrin												
82657-04-3	Pesticides	biphenthrin												
92-52-4	PAHs	biphenyl;1,1-												
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether							4.00E+02	2.00E+02				
111-44-4	SVOCs	bis(2-chloroethyl)ether						2.00E-02		3.00E-02				
39638-32-9	VOCs	bis(2-chloroisopropyl) ether												
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate						2.30E-01	4.50E-02	3.20E-01				
542-88-1	VOCs	bis(chloromethyl)ether								1.50E-04				
80-05-7	Phenols	bisphenol a												
7440-42-8	Metals	boron												
15541-45-4	Pesticides	bromate												
79-08-3	SVOCs	bromoacetic acid												
108-86-1	VOCs	bromobenzene												
75-27-4	VOCs	bromodichloromethane	TTHM NOTES					7.70E-01	7.30E-01	9.50E-01				
593-60-2	VOCs	bromoethene												
75-25-2	VOCs	bromoform	TTHM NOTES					5.80E+00	4.60E+00	7.00E+00				
74-83-9	VOCs	bromomethane						5.20E+02	3.00E+02	1.00E+02				
2104-96-3	Pesticides	bromophos												
1689-84-5	Herbicides	bromoxynil												
1689-99-2	Pesticides	bromoxynil octanoate												
106-99-0	VOCs	butadiene;1,3-												
71-36-3	VOCs	butanol;n-												
85-68-7	Phthalates	butyl benzyl phthalate						5.60E-01	1.30E-02	1.00E-01				
2008-41-5	Pesticides	butylate												
85-70-1	Phthalates	butylphthalyl butylglycolate												
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-												
75-60-5	Pesticides	cacodylic acid												
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES	3.70E+00	1.80E+00	1.00E+00	7.20E-01				4.20E+01	3.30E+01	9.30E+00	7.90E+00
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES	3.70E+00	1.80E+00	1.00E+00	7.20E-01				4.20E+01	3.30E+01	9.30E+00	7.90E+00
592-01-8	Cyanides	calcium cyanide												
105-60-2	SVOCs	caprolactam												
2425-06-1	Pesticides	captafol												
133-06-2	Pesticides	captan												

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63-25-2	Pesticides (Carbamate)	carbaryl			2.10E+00		2.10E+00					1.60E+00		
86-74-8	PAHs	carbazole												
1563-66-2	Pesticides (Carbamate)	carbofuran												
75-15-0	VOCs	carbon disulfide												
56-23-5	VOCs	carbon tetrachloride						2.00E-01		4.00E-01				
786-19-6	Pesticides	carbophenothion												
55285-14-8	Pesticides	carbosulfan												
5234-68-4	Pesticides	carboxin												
1306-38-3	Metals	cerium oxide and cerium compounds												
75-87-6	VOCs	chloral												
302-17-0	VOCs	chloral hydrate												
133-90-4	Herbicides	chloramben												
118-75-2	Pesticides	chloranil												
12789-03-6	Pesticides	chlordane		2.40E+00	2.40E+00	4.30E-03	4.30E-03	9.30E-05	2.20E-05	3.10E-04	9.00E-02	9.00E-02	4.00E-03	4.00E-03
143-50-0	SVOCs	chlordecone (kepone)												
16887-00-6	Nutrients	chloride		8.60E+05	8.60E+05	2.30E+05	2.30E+05							
90982-32-4	Pesticides	chlorimuron-ethyl												
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS	1.90E+01	1.90E+01	1.10E+01	1.10E+01				1.30E+01	1.30E+01	7.50E+00	7.50E+00
506-77-4	Cyanides	chlorine cyanide												
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS											
7758-19-2	Nutrients	chlorite												
75-68-3	VOCs	chloro-1,1-difluoroethane;1-												
126-99-8	VOCs	chloro-1,3-butadiene;2-												
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-												
95-69-2	SVOCs	chloro-2-methylaniline;4-												
79-11-8	SVOCs	chloroacetic acid												
532-27-4	SVOCs	chloroacetophenone;2-												
106-47-8	SVOCs	chloroaniline;p-												
108-90-7	VOCs	chlorobenzene						3.80E+02	1.00E+02	1.00E+02				
510-15-6	Pesticides	chlorobenzilate												
74-11-3	Pesticides	chlorobenzoic acid;p-												
98-56-6	VOCs	chlorobenzotrifluoride;4-												
109-69-3	VOCs	chlorobutane;1-												
59-50-7	Phenols	chlorocresol						3.60E+01		5.00E+02				
75-45-6	VOCs	chlorodifluoromethane												
67-66-3	VOCs	chloroform	TTHM NOTES					2.60E+02	1.00E+02	6.00E+01				
74-87-3	VOCs	chloromethane												
107-30-2	VOCs	chloromethyl methyl ether												
88-73-3	Pesticides	chloronitrobenzene;o-												
100-00-5	Pesticides	chloronitrobenzene;p-												
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT					1.50E+01		3.00E+01				
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-												
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-												
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-												
75-29-6	VOCs	chloropropane;2-												
1897-45-6	Pesticides	chlorothalonil												
95-49-8	VOCs	chlorotoluene;o-												
101-21-3	Pesticides	chlorpropham												
2921-88-2	Pesticides	chlorpyrifos		8.30E-02	8.30E-02	4.10E-02	4.10E-02				1.10E-02	1.10E-02	5.60E-03	5.60E-03
5598-13-0	Pesticides	chlorpyrifos-methyl												
64902-72-3	Herbicides	chlorsulfuron												
60238-56-4	Pesticides	chlorthiophos												
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES											
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES	5.50E+02	5.70E+02	1.80E+02	7.40E+01							

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18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES	1.50E+01	1.60E+01	1.00E+01	1.10E+01				1.10E+03	1.10E+03	5.00E+01	5.00E+01
218-01-9	cPAHs	CHRYSENE	PAH NOTES					1.40E+00	1.60E-02	1.20E-01				
8001-58-9	PAHs	coal tar creosote												
8007-45-2	VOCs	coke oven emissions												
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT	1.70E+01		1.10E+01		1.30E+03		1.30E+03	4.80E+00	4.80E+00	3.10E+00	3.10E+00
544-92-3	Cyanides	copper cyanide												
108-39-4	Phenols	cresol;m-												
95-48-7	Phenols	cresol;o-												
106-44-5	Phenols	cresol;p-												
4170-30-3	VOCs	crotonaldehyde												
98-82-8	VOCs	cumene												
21725-46-2	Pesticides	cyanazine												
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES	2.20E+01	2.20E+01	5.20E+00	5.20E+00	1.90E+01	9.00E+00	4.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
460-19-5	Cyanides	cyanogen												
506-68-3	Cyanides	cyanogen bromide												
110-82-7	VOCs	cyclohexane												
108-94-1	VOCs	cyclohexanone												
108-91-8	SVOCs	cyclohexylamine												
542-92-7	SVOCs	cyclopentadiene												
68085-85-8	Pesticides	cyhalothrin/karate												
52315-07-8	Pesticides	cypermethrin												
66215-27-8	Pesticides	cyromazine												
1861-32-1	Herbicides	dacthal												
75-99-0	Herbicides	dalapon, sodium salt												
39515-41-8	Pesticides	danitol												
94-82-6	Herbicides	db;2,4-												
72-54-8	Pesticides	ddd						3.60E-05	7.90E-06	1.20E-04				
72-55-9	Pesticides	dde						5.10E-05	8.80E-07	1.80E-05				
50-29-3	Pesticides	ddt		1.10E+00	1.10E+00	1.00E-03	1.00E-03	2.50E-05	1.20E-06	3.00E-05	1.30E-01	1.30E-01	1.00E-03	1.00E-03
1163-19-5	PBDEs	decabromodiphenyl ether												
8065-48-3	Pesticides	demeton					1.00E-01							1.00E-01
103-23-1	Phthalates	di(2-ethylhexyl)adipate												
2303-16-4	Pesticides	diallate												
333-41-5	Pesticides	diazinon			1.70E-01		1.70E-01					8.20E-01		8.20E-01
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES					1.40E-03	1.60E-05	1.20E-04				
132-64-9	PAHs	dibenzofuran												
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-												
631-64-1	SVOCs	dibromoacetic acid												
106-37-6	Pesticides	dibromobenzene;1,4-												
124-48-1	VOCs	dibromochloromethane	TTHM NOTES					6.50E-01	6.00E-01	8.00E-01				
84-74-2	Phthalates	di-butyl phthalate						4.50E+02	8.00E+00	2.00E+01				
1918-00-9	Herbicides	dicamba												
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS											
764-41-0	VOCs	dichloro-2-butene;1,4-												
79-43-6	SVOCs	dichloroacetic acid												
95-50-1	VOCs	dichlorobenzene;1,2-						2.00E+03	7.00E+02	1.00E+03				
541-73-1	VOCs	dichlorobenzene;1,3-						1.30E+01	2.00E+00	7.00E+00				
106-46-7	VOCs	dichlorobenzene;1,4-						4.60E+02	2.00E+02	3.00E+02				
91-94-1	SVOCs	dichlorobenzidine;3,3'-						3.10E-03		4.90E-02				
75-71-8	VOCs	dichlorodifluoromethane												
75-34-3	VOCs	dichloroethane;1,1-												
107-06-2	VOCs	dichloroethane;1,2-						9.30E+00	8.90E+00	9.90E+00				
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)												
75-35-4	VOCs	dichloroethylene;1,1-						1.20E+03	7.00E+02	3.00E+02				
156-59-2	VOCs	dichloroethylene;1,2-,cis												
156-60-5	VOCs	dichloroethylene;1,2-,trans						6.00E+02	2.00E+02	1.00E+02				
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT					2.50E+01	1.00E+01	1.00E+01				

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94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-								1.30E+03				
78-87-5	VOCs	dichloropropane;1,2-						7.10E-01		9.00E-01				
616-23-9	SVOCs	dichloropropanol;2,3-												
542-75-6	VOCs	dichloropropene;1,3-						2.40E-01	2.20E-01	2.70E-01				
62-73-7	Pesticides	dichlorvos												
115-32-2	Pesticides	dicofol												
77-73-6	VOCs	dicyclopentadiene												
60-57-1	Pesticides	dieldrin		2.50E+00	2.40E-01	1.90E-03	5.60E-02	6.10E-06	7.00E-08	1.20E-06	7.10E-01	7.10E-01	1.90E-03	1.90E-03
84-66-2	Phthalates	diethyl phthalate						4.20E+03	2.00E+02	6.00E+02				
111-46-6	Glycols	diethylene glycol												
693-21-0	Glycols	diethylene glycol dinitrate												
112-34-5	Glycols	diethylene glycol monobutyl ether												
111-90-0	Glycols	diethylene glycol monoethyl ether												
617-84-5	SVOCs	diethylformamide												
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate												
56-53-1	SVOCs	diethylstilbesterol												
43222-48-6	Pesticides	difenzoquat												
35367-38-5	Pesticides	diflubenzuron												
75-37-6	VOCs	difluoroethane;1,1-												
1445-75-6	SVOCs	diisopropyl methylphosphonate												
55290-64-7	Pesticides	dimethipin												
60-51-5	Pesticides	dimethoate												
119-90-4	SVOCs	dimethoxybenzidine;3,3'-												
131-11-3	Phthalates	dimethyl phthalate						9.20E+04	6.00E+02	2.00E+03				
120-61-6	Phthalates	dimethyl terephthalate												
124-40-3	VOCs	dimethylamine												
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-												
95-68-1	SVOCs	dimethylaniline;2,4-												
121-69-7	SVOCs	dimethylaniline;N,N-												
119-93-7	SVOCs	dimethylbenzidine;3,3'-												
68-12-2	VOCs	dimethylformamide;N,N-												
57-14-7	VOCs	dimethylhydrazine;1,1-												
540-73-8	VOCs	dimethylhydrazine;1,2-												
105-67-9	Phenols	dimethylphenol;2,4-						8.50E+01		1.00E+02				
576-26-1	Phenols	dimethylphenol;2,6-												
95-65-8	Phenols	dimethylphenol;3,4-												
99-65-0	Explosives	dinitrobenzene;m-												
528-29-0	SVOCs	dinitrobenzene;o-												
100-25-4	SVOCs	dinitrobenzene;p-												
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-												
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT					6.00E+01	3.00E+01	1.00E+01				
25550-58-7	Phenols	dinitrophenols								1.00E+01				
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-												
121-14-2	Explosives	dinitrotoluene;2,4-						3.90E-02		4.90E-02				
606-20-2	Explosives	dinitrotoluene;2,6-												
117-84-0	Phthalates	di-n-octyl phthalate												
88-85-7	Herbicides	dinoseb												
123-91-1	VOCs	dioxane;1,4-												
957-51-7	Pesticides	diphenamid												
122-39-4	SVOCs	diphenylamine												
122-66-7	SVOCs	diphenylhydrazine;1,2-						1.50E-02	1.00E-02	3.00E-02				
85-00-7	Pesticides	diquat												
1937-37-7	Dyes	direct black 38												
2602-46-2	Dyes	direct blue 6												

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16071-86-6	Dyes	direct brown 95												
2610-05-1	Dyes	direct sky blue												
298-04-4	Pesticides	disulfoton												
505-29-3	SVOCs	dithiane;1,4-												
330-54-1	Pesticides (Carbamate)	diuron												
534-52-1	Phenols	DNOC						7.10E+00	3.00E+00	2.00E+00				
2439-10-3	Pesticides	dodine												
115-29-7	Pesticides	endosulfan		2.20E-01		5.60E-02					3.40E-02		8.70E-03	
1031-07-8	Pesticides	endosulfan sulfate						9.70E+00	9.00E+00	2.00E+01				
959-98-8	Pesticides	endosulfan;alpha			2.20E-01		5.60E-02	9.70E+00	6.00E+00	2.00E+01		3.40E-02		8.70E-03
33213-65-9	Pesticides	endosulfan;beta			2.20E-01		5.60E-02	9.70E+00		2.00E+01		3.40E-02		8.70E-03
145-73-3	Herbicides	endothall												
72-20-8	Pesticides	endrin		1.80E-01	8.60E-02	2.30E-03	3.60E-02	3.40E-02	2.00E-03	3.00E-02	3.70E-02	3.70E-02	2.30E-03	2.30E-03
7421-93-4	Pesticides	endrin aldehyde						3.40E-02		1.00E+00				
106-89-8	VOCs	epichlorohydrin												
106-88-7	VOCs	epoxybutane												
16672-87-0	Pesticides	ethephon												
563-12-2	Pesticides	ethion												
111-15-9	VOCs	ethoxyethanol acetate;2-												
110-80-5	VOCs	ethoxyethanol;2-												
141-78-6	VOCs	ethyl acetate												
140-88-5	VOCs	ethyl acrylate												
75-00-3	VOCs	ethyl chloride												
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-												
60-29-7	VOCs	ethyl ether												
97-63-2	VOCs	ethyl methacrylate												
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate												
100-41-4	VOCs	ethylbenzene						2.00E+02	2.90E+01	6.80E+01				
109-78-4	SVOCs	ethylene cyanohydrin												
107-15-3	SVOCs	ethylene diamine												
106-93-4	VOCs	ethylene dibromide (EDB)												
107-21-1	VOCs	ethylene glycol												
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)												
75-21-8	VOCs	ethylene oxide												
96-45-7	SVOCs	ethylene thiourea												
84-72-0	Phthalates	ethylphthalyl ethylglycolate												
101200-48-0	Pesticides	express												
22224-92-6	Pesticides	fenamiphos												
115-90-2	Pesticides	fensulfothion												
2164-17-2	Pesticides	fluometuron												
206-44-0	PAHs	fluoranthene						1.60E+01	6.00E+00	2.00E+01				
86-73-7	PAHs	fluorene						4.20E+02	1.00E+01	5.00E+01				
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES											
59756-60-4	Pesticides	fluridone												
56425-91-3	Pesticides	flurprimidol												
66332-96-5	Pesticides	flutolanil												
69409-94-5	Pesticides	fluvalinate												
133-07-3	Pesticides	folpet												
72178-02-0	Pesticides	fomesafen												
944-22-9	Pesticides	fonofos												
50-00-0	VOCs	formaldehyde												
64-18-6	VOCs	formic acid												
39148-24-8	Pesticides	fosetyl-al												
110-00-9	Furans	furan												

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67-45-8	SVOCs	furazolidone												
98-01-1	VOCs	furfural												
531-82-8	SVOCs	furium												
60568-05-0	Pesticides	furmecyclox												
77182-82-2	SVOCs	glufosinate-ammonium												
765-34-4	VOCs	glycidaldehyde												
1071-83-6	SVOCs	glyphosate												
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE											
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE											
86-50-0	Pesticides	guthion					1.00E-02							1.00E-02
69806-40-2	Pesticides	haloxyfop-methyl												
79277-27-3	Pesticides	harmony												
76-44-8	Pesticides	heptachlor		5.20E-01	5.20E-01	3.80E-03	3.80E-03	9.90E-06	3.40E-07	5.90E-06	5.30E-02	5.30E-02	3.60E-03	3.60E-03
1024-57-3	Pesticides	heptachlor epoxide			5.20E-01		3.80E-03	7.40E-06	2.40E-06	3.20E-05		5.30E-02		3.60E-03
142-82-5	VOCs	heptane;n-												
87-82-1	SVOCs	hexabromobenzene												
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-												
118-74-1	Pesticides	hexachlorobenzene						5.10E-05	5.00E-06	7.90E-05				
87-68-3	VOCs	hexachlorobutadiene						6.90E-01	1.00E-02	1.00E-02				
319-84-6	Pesticides	hexachlorocyclohexane;alpha						5.00E-04	4.80E-05	3.60E-04				
319-85-7	Pesticides	hexachlorocyclohexane;beta-						1.80E-03	1.30E-03	8.00E-03				
319-86-8	Pesticides	hexachlorocyclohexane;delta-												
608-73-1	SVOCs	hexachlorocyclohexane;technical								6.60E-03				
77-47-4	Pesticides	hexachlorocyclopentadiene						1.50E+02	1.00E+00	4.00E+00				
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture												
67-72-1	VOCs	hexachloroethane						1.10E-01	2.00E-02	1.00E-01				
70-30-4	SVOCs	hexachlorophene												
822-06-0	VOCs	hexamethylene diisocyanate;1,6-												
110-54-3	VOCs	hexane;n-												
591-78-6	VOCs	hexanone;2-												
51235-04-2	Pesticides	hexazinone												
302-01-2	VOCs	hydrazine												
10034-93-2	SVOCs	hydrazine sulfate												
7647-01-0	VOCs	hydrogen chloride												
74-90-8	Cyanides	hydrogen cyanide												
7783-06-4	VOCs	hydrogen sulfide					2.00E+00							2.00E+00
123-31-9	SVOCs	hydroquinone												
35554-44-0	Pesticides	imazalil												
81335-37-7	Pesticides	imazaquin												
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES					1.40E-02	1.60E-04	1.20E-03				
36734-19-7	Pesticides	iprodione												
7439-89-6	Metals	iron					1.00E+03							
78-83-1	VOCs	isobutyl alcohol												
78-59-1	SVOCs	isophorone						2.70E+01		3.40E+01				
33820-53-0	Pesticides	isopropalin												
1832-54-8	SVOCs	isopropyl methyl phosphonic acid												
82558-50-7	Pesticides	isoxaben												
77501-63-4	Pesticides	lactofen												
7439-92-1	Metals	LEAD	LEAD NOTES	6.50E+01	6.50E+01	2.50E+00	2.50E+00				2.10E+02	2.10E+02	8.10E+00	8.10E+00
unavailable02	Metals	lead alkyls												
58-89-9	Pesticides	lindane		2.00E+00	9.50E-01	8.00E-02		1.50E+01	4.30E-01	4.20E+00	1.60E-01	1.60E-01		
330-55-2	Pesticides (Carbamate)	linuron												
7791-03-9	Perchlorates	lithium perchlorate												
83055-99-6	Pesticides	londax												

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121-75-5	Pesticides	malathion					1.00E-01							1.00E-01
108-31-6	SVOCs	maleic anhydride												
123-33-1	SVOCs	maleic hydrazide												
109-77-3	VOCs	malononitrile												
8018-01-7	Pesticides	mancozeb												
12427-38-2	Pesticides	maneb												
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES							5.00E+01				
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES							5.00E+01				
950-10-7	Pesticides	mephosfolan												
24307-26-4	Pesticides	mepiquat chloride												
7487-94-7	Metals	mercuric chloride												
7439-97-6	Metals	mercury		2.10E+00	1.40E+00	1.20E-02	7.70E-01				1.80E+00	1.80E+00	2.50E-02	9.40E-01
150-50-5	Pesticides	merphos												
57837-19-1	Pesticides	metalaxyl												
126-98-7	VOCs	methacrylonitrile												
10265-92-6	Pesticides	methamidosphos												
67-56-1	VOCs	methanol												
950-37-8	Pesticides	methidathion												
16752-77-5	Pesticides (Carbamate)	methomyl												
99-59-2	SVOCs	methoxy-5-nitroaniline;2-												
72-43-5	Pesticides	methoxychlor					3.00E-02			2.00E-02				3.00E-02
110-49-6	VOCs	methoxyethanol acetate;2-												
109-86-4	VOCs	methoxyethanol;2-												
79-20-9	VOCs	methyl acetate												
96-33-3	VOCs	methyl acrylate												
78-93-3	VOCs	methyl ethyl ketone												
108-10-1	VOCs	methyl isobutyl ketone												
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES											
80-62-6	VOCs	methyl methacrylate												
90-12-0	PAHs	methyl naphthalene;1-												
91-57-6	PAHs	methyl naphthalene;2-												
298-00-0	Pesticides	methyl parathion												
25013-15-4	VOCs	methyl styrene												
98-83-9	SVOCs	methyl styrene, alpha												
1634-04-4	VOCs	methyl tert-butyl ether												
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-												
99-55-8	SVOCs	methyl-5-nitroaniline;2-												
636-21-5	SVOCs	methylaniline hydrochloride;2-												
95-53-4	VOCs	methylaniline;2-												
108-87-2	VOCs	methylcyclohexane												
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-												
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-												
74-95-3	VOCs	methylene bromide												
75-09-2	VOCs	methylene chloride						1.60E+01	1.00E+01	2.00E+01				
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)												
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)												
101-77-9	SVOCs	methylenebisbenzenamine;4,4-												
60-34-4	VOCs	methylhydrazine												
51218-45-2	Pesticides	metolachlor												
21087-64-9	Pesticides	metribuzin												
7786-34-7	Pesticides	mevinphos												
2385-85-5	Pesticides	mirex					1.00E-03							1.00E-03
2212-67-1	Pesticides	molinate												
7439-98-7	Metals	molybdenum												

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10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS											
unavailable03	SVOCs	monochlorobutanes (not in HSDB)												
300-76-5	Pesticides	naled												
91-20-3	PAHs	naphthalene												
15299-99-7	Pesticides	napropamide												
104-51-8	VOCs	n-butylbenzene												
2429-74-5	Dyes	niagara blue 4B												
unavailable04	Metals	nickel refinery dust												
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT	1.40E+03	4.70E+02	1.60E+02	5.20E+01	1.50E+02	8.00E+01	6.10E+02	7.40E+01	7.40E+01	8.20E+00	8.20E+00
12035-72-2	Metals	nickel subsulfide												
14797-55-8	Nutrients	nitrate								1.00E+04				
10102-43-9	Gases	nitric oxide												
14797-65-0	Nutrients	nitrite												
88-74-4	SVOCs	nitroaniline, 2-												
100-01-6	SVOCs	nitroaniline, 4-												
98-95-3	Explosives	nitrobenzene						5.50E+01	3.00E+01	1.00E+01				
67-20-9	SVOCs	nitrofurantoin												
59-87-0	SVOCs	nitrofurazone												
10102-44-0	Gases	nitrogen dioxide												
556-88-7	SVOCs	nitroguanidine												
79-46-9	VOCs	nitropropane;2-												
1116-54-7	SVOCs	nitrosodiethanolamine;N-												
55-18-5	SVOCs	nitrosodiethylamine;N-								8.00E-04				
62-75-9	SVOCs	nitrosodimethylamine;N-						6.50E-04		6.90E-04				
924-16-3	VOCs	nitroso-di-n-butylamine;N-								6.30E-03				
621-64-7	SVOCs	nitroso-di-n-propylamine;N-						4.40E-03		5.00E-03				
86-30-6	SVOCs	nitrosodiphenylamine;N-						6.20E-01		3.30E+00				
4549-40-0	SVOCs	nitrosomethylvinylamine,n-												
759-73-9	SVOCs	nitroso-n-ethylurea;n-												
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-												
684-93-5	SVOCs	nitroso-n-methylurea,n-												
930-55-2	SVOCs	nitrosopyrrolidine;N-								1.60E-02				
99-08-1	Explosives	nitrotoluene, m-												
88-72-2	Explosives	nitrotoluene, o-												
99-99-0	Explosives	nitrotoluene, p-												
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-												
84852-15-3	Phenols	nonylphenol			2.80E+01		6.60E+00					7.00E+00		1.70E+00
27314-13-2	Pesticides	norflurazon												
85509-19-9	Herbicides	nustar												
32536-52-0	PBDEs	octabromodiphenyl ether												
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine												
152-16-9	SVOCs	octamethylpyrophosphoramide												
19044-88-3	Pesticides	oryzalin												
19666-30-9	Pesticides	oxadiazon												
23135-22-0	Pesticides (Carbamate)	oxamyl												
42874-03-3	Pesticides	oxyfluorfen												
76738-62-0	Herbicides	paclobutrazol												
unavailable05	PAHs	PAHs	PAH NOTES											
4685-14-7	Pesticides	paraquat												
56-38-2	Pesticides	parathion		6.50E-02	6.50E-02	1.30E-02	1.30E-02							
1114-71-2	Pesticides	pebulate												
40487-42-1	Pesticides	pendimethalin												
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-												
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-												

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32534-81-9	PBDEs	pentabromodiphenyl ethers												
608-93-5	SVOCs	pentachlorobenzene								1.00E-01				
82-68-8	Pesticides	pentachloronitrobenzene												
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT	2.00E+01	1.90E+01	1.30E+01	1.50E+01	4.60E-02	2.00E-03	3.00E-02	1.30E+01	1.30E+01	7.90E+00	7.90E+00
14797-73-0	Perchlorates	perchlorate and perchlorate salts												
52645-53-1	Pesticides	permethrin												
72-56-0	Pesticides	perthane												
unavailable19	General Chemistry	pH	pH NOTES				6.5 – 9			5 – 9				6.5 – 8.5
85-01-8	PAHs	phenanthrene												
13684-63-4	Pesticides	phenmedipham												
108-95-2	Phenols	phenol						1.80E+04	9.00E+03	4.00E+03				
106-50-3	SVOCs	phenylenediamine, p-												
108-45-2	SVOCs	phenylenediamine;m-												
95-54-5	SVOCs	phenylenediamine;o-												
62-38-4	Metals (organometallic)	phenylmercuric acetate												
90-43-7	Phenols	phenylphenol;2-												
298-02-2	Pesticides	phorate												
75-44-5	VOCs	phosgene												
732-11-6	Pesticides	phosmet												
7803-51-2	Gases	phosphine												
7664-38-2	SVOCs	phosphoric acid												
7723-14-0	Metals	phosphorus												
100-21-0	Phthalates	phthalic acid;p-												
85-44-9	Phthalates	phthalic anhydride												
1918-02-1	Herbicides	picloram												
29232-93-7	Pesticides	pirimiphos-methyl												
59536-65-1	PBBs	polybrominated biphenyls												
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)		2.00E+00		1.40E-02	1.40E-02	1.70E-04	7.00E-06	6.40E-05	1.00E+01		3.00E-02	3.00E-02
151-50-8	Cyanides	potassium cyanide												
7778-74-7	Perchlorates	potassium perchlorate												
506-61-6	Cyanides	potassium silver cyanide												
67747-09-5	Pesticides	prochloraz (not in HSDB)												
26399-36-0	Pesticides	profluralin												
1610-18-0	Pesticides	prometon												
7287-19-6	Pesticides	prometryn												
23950-58-5	Pesticides	pronamide												
1918-16-7	Pesticides	propachlor												
709-98-8	Pesticides	propanil												
2312-35-8	Pesticides	propargite												
107-19-7	VOCs	propargyl alcohol												
139-40-2	Pesticides	propazine												
122-42-9	Pesticides	propham												
60207-90-1	Pesticides	propiconazole												
123-38-6	VOCs	propionaldehyde												
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-												
103-65-1	VOCs	propylbenzene;n-												
57-55-6	Glycols	propylene glycol												
6423-43-4	Glycols	propylene glycol dinitrate;1,2-												
52125-53-8	Glycols	propylene glycol monoethyl ether												
107-98-2	Glycols	propylene glycol monomethyl ether												
75-56-9	VOCs	propylene oxide												
81335-77-5	Pesticides	pursuit												
51630-58-1	Pesticides	pydrin												
129-00-0	PAHs	pyrene						3.10E+02	8.00E+00	2.00E+01				

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Surface Water Aquatic Life Fresh/Acute 173-201A WAC (µg/L)	Surface Water Aquatic Life Fresh/Acute CWA §304 (µg/L)	Surface Water Aquatic Life Fresh/Chronic 173-201A WAC (µg/L)	Surface Water Aquatic Life Fresh/Chronic CWA §304 (µg/L)	Surface Water Human Health Fresh Water 173-201A WAC (µg/L)	Surface Water Human Health Fresh Water 40 CFR 131.45 (µg/L)	Surface Water Human Health Fresh Water CWA §304 (µg/L)	Surface Water Aquatic Life Marine/Acute 173-201A WAC (µg/L)	Surface Water Aquatic Life Marine/Acute CWA §304 (µg/L)	Surface Water Aquatic Life Marine/Chronic 173-201A WAC (µg/L)	Surface Water Aquatic Life Marine/Chronic CWA §304 (µg/L)
110-86-1	VOCs	pyridine												
13593-03-8	Pesticides	quinalphos												
91-22-5	SVOCs	quinoline												
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE											
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES											
121-82-4	Explosives	rdx												
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE											
10453-86-8	Pesticides	resmethrin												
299-84-3	Pesticides	ronnel												
83-79-4	Pesticides	rotenone												
78-48-8	Pesticides	s,s;s-tributylphosphorotrithioate												
78587-05-0	Pesticides	savey												
135-98-8	VOCs	sec-butylbenzene												
7783-00-8	Metals	selenious acid												
7782-49-2	Metals	selenium and compounds		2.00E+01		5.00E+00		1.20E+02	6.00E+01	1.70E+02	2.90E+02	2.90E+02	7.10E+01	7.10E+01
630-10-4	Metals (organometallic)	selenourea												
74051-80-2	Pesticides	sethoxydim												
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT	3.40E+00	3.20E+00						1.90E+00	1.90E+00		
506-64-9	Cyanides	silver cyanide												
122-34-9	Pesticides	simazine												
26628-22-8	Metals	sodium azide												
143-33-9	Cyanides	sodium cyanide												
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate												
62-74-8	Metals (organometallic)	sodium fluoroacetate												
13718-26-8	Metals	sodium metavanadate												
7601-89-0	Perchlorates	sodium perchlorate												
7440-24-6	Metals	strontium												
57-24-9	SVOCs	strychnine												
100-42-5	VOCs	styrene												
unavailable17	Metals	sulfate												
88671-89-0	Pesticides	systhane												
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES					6.40E-08	1.30E-08	5.00E-09				
34014-18-1	Pesticides	tebuthiuron												
3383-96-8	Pesticides	temephos												
5902-51-2	Pesticides	terbacil												
13071-79-9	SVOCs	terbufos												
886-50-0	Pesticides	terbutryn												
98-06-6	VOCs	tert-butylbenzene												
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'												
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-								3.00E-02				
630-20-6	VOCs	tetrachloroethane;1,1,1,2-												
79-34-5	VOCs	tetrachloroethane;1,1,2,2-						1.20E-01	1.00E-01	2.00E-01				
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES					4.90E+00	2.40E+00	1.00E+01				
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT											
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-												
961-11-5	Pesticides	tetrachlorvinphos												
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate												
78-00-2	Metals (organometallic)	tetraethyl lead												
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-												
109-99-9	Furans	tetrahydrofuran												
1314-32-5	Metals	thallic oxide												
563-68-8	Metals	thallium acetate												
6533-73-9	Metals	thallium carbonate												
7791-12-0	Metals	thallium chloride												

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**Surface Water** Aquatic Life Fresh/Acute 173-201A WAC (µg/L)	**Surface Water** Aquatic Life Fresh/Acute CWA §304 (µg/L)	**Surface Water** Aquatic Life Fresh/Chronic 173-201A WAC (µg/L)	**Surface Water** Aquatic Life Fresh/Chronic CWA §304 (µg/L)	**Surface Water** Human Health Fresh Water 173-201A WAC (µg/L)	**Surface Water** Human Health Fresh Water 40 CFR 131.45 (µg/L)	**Surface Water** Human Health Fresh Water CWA §304 (µg/L)	**Surface Water** Aquatic Life Marine/Acute 173-201A WAC (µg/L)	**Surface Water** Aquatic Life Marine/Acute CWA §304 (µg/L)	**Surface Water** Aquatic Life Marine/Chronic 173-201A WAC (µg/L)	**Surface Water** Aquatic Life Marine/Chronic CWA §304 (µg/L)
10102-45-1	Metals	thallium nitrate												
12039-52-0	Metals	thallium selenite												
7446-18-6	Metals	thallium(I) sulfate												
7440-28-0	Metals	thallium, soluble salts						2.40E-01	1.70E+00	2.40E-01				
28249-77-6	Pesticides	thiobencarb												
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-												
39196-18-4	Pesticides	thiofanox												
23564-05-8	Pesticides	thiophanate-methyl												
137-26-8	Pesticides	thiram												
7440-31-5	Metals	tin												
118-96-7	Explosives	tnt												
108-88-3	VOCs	toluene						1.80E+02	7.20E+01	5.70E+01				
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-												
584-84-9	VOCs	toluene-2,4-diisocyanate												
91-08-7	VOCs	toluene-2,6-diisocyanate												
95-80-7	SVOCs	toluenediamine;2,4-												
95-70-5	SVOCs	toluenediamine;2,5-												
823-40-5	SVOCs	toluenediamine;2,6-												
106-49-0	SVOCs	toluidine;p-												
unavailable18	General Chemistry	total dissolved solids												
8001-35-2	Pesticides	toxaphene		7.30E-01	7.30E-01	2.00E-04	2.00E-04	3.20E-05		7.00E-04	2.10E-01	2.10E-01	2.00E-04	2.00E-04
93-72-1	Herbicides	tp;2,4,5-								1.00E+02				
unavailable09	Petroleum	tph, diesel range organics												
unavailable10	Petroleum	tph, heavy oils												
unavailable11	Petroleum	tph, mineral oils												
unavailable25	Petroleum	tph: gasoline range organics, benzene present												
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene												
66841-25-6	Pesticides	tralomethrin												
2303-17-5	Pesticides	triallate												
82097-50-5	Pesticides	triasulfuron												
615-54-3	VOCs	tribromobenzene;1,2,4-												
688-73-3	Organotins	tributyltin			4.60E-01		7.20E-02					4.20E-01		7.40E-03
56-35-9	Organotins	tributyltin oxide												
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS											
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-												
76-03-9	SVOCs	trichloroacetic acid												
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-												
634-93-5	SVOCs	trichloroaniline;2,4,6-												
120-82-1	VOCs	trichlorobenzene;1,2,4-						1.20E-01	3.60E-02	7.10E-02				
71-55-6	VOCs	trichloroethane;1,1,1-						4.70E+04	2.00E+04	1.00E+04				
79-00-5	VOCs	trichloroethane;1,1,2-						4.40E-01	3.50E-01	5.50E-01				
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES					3.80E-01	3.00E-01	6.00E-01				
75-69-4	VOCs	trichlorofluoromethane												
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT							3.00E+02				
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT					2.50E-01		1.50E+00				
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-												
598-77-6	VOCs	trichloropropane;1,1,2-												
96-18-4	VOCs	trichloropropane;1,2,3-												
96-19-5	VOCs	trichloropropene;1,2,3-												
58138-08-2	Pesticides	tridiphane												
121-44-8	VOCs	triethylamine												
1582-09-8	Pesticides	trifluralin												
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES											
512-56-1	SVOCs	trimethyl phosphate												
526-73-8	VOCs	trimethylbenzene;1,2,3-												
95-63-6	VOCs	trimethylbenzene;1,2,4-												
108-67-8	VOCs	trimethylbenzene;1,3,5-												

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Surface Water Aquatic Life Fresh/Acute 173-201A WAC (µg/L)	Surface Water Aquatic Life Fresh/Acute CWA §304 (µg/L)	Surface Water Aquatic Life Fresh/Chronic 173-201A WAC (µg/L)	Surface Water Aquatic Life Fresh/Chronic CWA §304 (µg/L)	Surface Water Human Health Fresh Water 173-201A WAC (µg/L)	Surface Water Human Health Fresh Water 40 CFR 131.45 (µg/L)	Surface Water Human Health Fresh Water CWA §304 (µg/L)	Surface Water Aquatic Life Marine/Acute 173-201A WAC (µg/L)	Surface Water Aquatic Life Marine/Acute CWA §304 (µg/L)	Surface Water Aquatic Life Marine/Chronic 173-201A WAC (µg/L)	Surface Water Aquatic Life Marine/Chronic CWA §304 (µg/L)
99-35-4	Explosives	trinitrobenzene;1,3,5-												
479-45-8	Explosives	trinitrophenylmethylnitramine												
unavailable12	Radionuclides	uranium, soluble salts												
7440-62-2	Metals	vanadium												
1314-62-1	Metals	vanadium pentoxide												
27774-13-6	Metals	vanadyl sulfate												
1929-77-7	Pesticides	vernam												
50471-44-8	Pesticides	vinclozolin												
108-05-4	VOCs	vinyl acetate												
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES					2.00E-02		2.20E-02				
81-81-2	Pesticides	warfarin												
8012-95-1	Petroleum	white mineral oil												
108-38-3	VOCs	xylene;m-												
95-47-6	VOCs	xylene;o-												
106-42-3	VOCs	xylene;p-												
1330-20-7	VOCs	xylenes												
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT	1.10E+02	1.20E+02	1.00E+02	1.20E+02	2.30E+03	1.00E+03	7.40E+03	9.00E+01	9.00E+01	8.10E+01	8.10E+01
557-21-1	Cyanides	zinc cyanide												
1314-84-7	Metals	zinc phosphide												
12122-67-7	Pesticides	zineb												

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83-32-9	PAHs	acenaphthene		1.10E+02	3.00E+01	9.00E+01				
208-96-8	PAHs	acenaphthylene								
30560-19-1	Pesticides	acephate								
75-07-0	VOCs	acetaldehyde					4.10E+00	1.10E+00	9.00E+00	1.10E+01
34256-82-1	Pesticides	acetochlor								
67-64-1	VOCs	acetone					1.40E+04		3.10E+04	
75-86-5	VOCs	acetone cyanohydrin					9.10E-01		2.00E+00	
75-05-8	VOCs	acetonitrile					2.70E+01		6.00E+01	
98-86-2	SVOCs	acetophenone								
62476-59-9	Herbicides	acifluorfen, sodium								
107-02-8	VOCs	acrolein		1.10E+00		4.00E+02	9.10E-03		2.00E-02	
79-06-1	VOCs	acrylamide					2.70E+00	2.50E-02	6.00E+00	2.50E-01
79-10-7	VOCs	acrylic acid					4.60E-01		1.00E+00	
107-13-1	VOCs	acrylonitrile		2.80E-02		7.00E+00	9.10E-01	3.70E-02	2.00E+00	3.70E-01
15972-60-8	Pesticides	alachlor								
1596-84-5	Pesticides	alar						4.90E-01		4.90E+00
116-06-3	Pesticides (Carbamate)	aldicarb								
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone								
309-00-2	Pesticides	aldrin		5.80E-06	4.10E-08	7.70E-07		5.10E-04		5.10E-03
74223-64-6	Pesticides	ally								
107-18-6	VOCs	allyl alcohol					4.60E-02		1.00E-01	
107-05-1	VOCs	allyl chloride					4.60E-01	4.20E-01	1.00E+00	4.20E+00
7429-90-5	Metals	aluminum					2.30E+00		5.00E+00	
20859-73-8	Metals	aluminum phosphide								
67485-29-4	Pesticides	amdro								
834-12-8	Pesticides	ametryn								
591-27-5	Phenols	aminophenol;m-								
504-24-5	SVOCs	aminopyridine;4-								
33089-61-1	Pesticides	amitraz								
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES				2.20E+02		4.90E+02	
7790-98-9	Perchlorates	ammonium perchlorate								
7773-06-0	Pesticides	ammonium sulfamate								
62-53-3	SVOCs	aniline					4.60E-01	1.60E+00	1.00E+00	1.60E+01
120-12-7	PAHs	anthracene		4.60E+03	1.00E+02	4.00E+02				
7440-36-0	Metals	antimony		1.80E+02	9.00E+01	6.40E+02				
1314-60-9	Metals	antimony pentoxide								
28300-74-5	Metals	antimony potassium tartrate								
1332-81-6	Metals	antimony tetroxide								
1309-64-4	Metals	antimony trioxide					9.10E-02		2.00E-01	
74115-24-5	Pesticides	apollo								
140-57-8	SVOCs	aramite						3.50E-01		3.50E+00
12674-11-2	PCBs	aroclor 1016						1.30E-01		1.30E+00
11097-69-1	PCBs	aroclor 1254						4.40E-03		4.40E-02
11096-82-5	PCBs	aroclor 1260						4.40E-03		4.40E-02
7440-38-2	Metals	arsenic, inorganic		1.00E+01	1.40E-01	1.40E-01	6.90E-03	5.80E-04	1.50E-02	5.80E-03
7784-42-1	Metals	arsine					2.30E-02		5.00E-02	
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE							
76578-14-8	Pesticides	assure								
3337-71-1	Pesticides	asulam								
1912-24-9	Pesticides	atrazine								
65195-55-3	Pesticides	avermectin B1								
103-33-3	Pesticides	azobenzene						8.10E-02		8.10E-01
7440-39-3	Metals	barium and compounds					2.30E-01		5.00E-01	
542-62-1	Metals	barium cyanide								

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Surface Water Human Health Marine Waters 173-201A WAC (µg/L)	Surface Water Human Health Marine Waters 40 CFR 131.45 (µg/L)	Surface Water Human Health Marine Waters CWA §304 (µg/L)	Air Method B Non cancer (μg/m^3)	Air Method B Cancer (μg/m^3)	Air Method C Non cancer (μg/m^3)	Air Method C Cancer (μg/m^3)
114-26-1	Pesticides	baygon								
43121-43-3	Pesticides	bayleton								
68359-37-5	Pesticides	baythroid								
1861-40-1	Pesticides	benefin								
17804-35-2	Pesticides	benomyl								
25057-89-0	Herbicides	bentazon								
100-52-7	SVOCs	benzaldehyde								
71-43-2	VOCs	BENZENE		1.60E+00		1.60E+01	1.40E+01	3.20E-01	3.00E+01	3.20E+00
108-98-5	SVOCs	benzenethiol								
92-87-5	SVOCs	benzidine		2.30E-05		1.10E-02		3.70E-05		3.70E-04
191-24-2	PAHs	benzo(g,h,i)perylene								
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES	2.10E-02	1.60E-04	1.30E-03		2.30E-02		2.30E-01
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES	2.10E-03	1.60E-05	1.30E-04	9.10E-04	1.10E-03	2.00E-03	1.10E-02
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES	2.10E-02	1.60E-04	1.30E-03		2.30E-02		2.30E-01
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES	2.10E-01	1.60E-03	1.30E-02		2.30E-02		2.30E-01
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT							
98-07-7	VOCs	benzotrichloride								
100-51-6	SVOCs	benzyl alcohol								
100-44-7	VOCs	benzyl chloride					4.60E-01	5.10E-02	1.00E+00	5.10E-01
7440-41-7	Metals	beryllium					9.10E-03	1.00E-03	2.00E-02	1.00E-02
91-58-7	PAHs	beta-chloronaphthalene		1.80E+02	1.00E+02	1.00E+03				
141-66-2	SVOCs	bidrin								
82657-04-3	Pesticides	biphenthrin								
92-52-4	PAHs	biphenyl;1,1-					1.80E-01		4.00E-01	
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether			9.00E+02	4.00E+03		2.50E-01		2.50E+00
111-44-4	SVOCs	bis(2-chloroethyl)ether		6.00E-02		2.20E+00		7.60E-03		7.60E-02
39638-32-9	VOCs	bis(2-chloroisopropyl) ether								
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate		2.50E-01	4.60E-02	3.70E-01		1.00E+00		1.00E+01
542-88-1	VOCs	bis(chloromethyl)ether				1.70E-02		4.00E-05		4.00E-04
80-05-7	Phenols	bisphenol a								
7440-42-8	Metals	boron					9.10E+00		2.00E+01	
15541-45-4	Pesticides	bromate								
79-08-3	SVOCs	bromoacetic acid								
108-86-1	VOCs	bromobenzene					2.70E+01		6.00E+01	
75-27-4	VOCs	bromodichloromethane	TTHM NOTES	3.60E+00	2.80E+00	2.70E+01		6.80E-02		6.80E-01
593-60-2	VOCs	bromoethene					1.40E+00	7.80E-02	3.00E+00	7.80E-01
75-25-2	VOCs	bromoform	TTHM NOTES	2.70E+01	1.20E+01	1.20E+02		2.30E+00		2.30E+01
74-83-9	VOCs	bromomethane		2.40E+03		1.00E+04	2.30E+00		5.00E+00	
2104-96-3	Pesticides	bromophos								
1689-84-5	Herbicides	bromoxynil								
1689-99-2	Pesticides	bromoxynil octanoate								
106-99-0	VOCs	butadiene;1,3-					9.10E-01	8.30E-02	2.00E+00	8.30E-01
71-36-3	VOCs	butanol;n-								
85-68-7	Phthalates	butyl benzyl phthalate		5.80E-01	1.30E-02	1.00E-01				
2008-41-5	Pesticides	butylate								
85-70-1	Phthalates	butylphthalyl butylglycolate								
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-								
75-60-5	Pesticides	cacodylic acid								
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES				4.60E-03	1.40E-03	1.00E-02	1.40E-02
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES				4.60E-03	1.40E-03	1.00E-02	1.40E-02
592-01-8	Cyanides	calcium cyanide								
105-60-2	SVOCs	caprolactam					1.00E+00		2.20E+00	
2425-06-1	Pesticides	captafol						5.80E-02		5.80E-01
133-06-2	Pesticides	captan						3.80E+00		3.80E+01

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Surface Water Human Health Marine Waters 173-201A WAC (µg/L)	Surface Water Human Health Marine Waters 40 CFR 131.45 (µg/L)	Surface Water Human Health Marine Waters CWA §304 (µg/L)	Air Method B Non cancer (µg/m³)	Air Method B Cancer (µg/m³)	Air Method C Non cancer (µg/m³)	Air Method C Cancer (µg/m³)
63-25-2	Pesticides (Carbamate)	carbaryl								
86-74-8	PAHs	carbazole								
1563-66-2	Pesticides (Carbamate)	carbofuran								
75-15-0	VOCs	carbon disulfide					3.20E+02		7.00E+02	
56-23-5	VOCs	carbon tetrachloride		3.50E-01		5.00E+00	4.60E+01	4.20E-01	1.00E+02	4.20E+00
786-19-6	Pesticides	carbophenothion								
55285-14-8	Pesticides	carbosulfan								
5234-68-4	Pesticides	carboxin								
1306-38-3	Metals	cerium oxide and cerium compounds					4.20E-01		9.10E-01	
75-87-6	VOCs	chloral								
302-17-0	VOCs	chloral hydrate								
133-90-4	Herbicides	chloramben								
118-75-2	Pesticides	chloranil								
12789-03-6	Pesticides	chlordane		9.30E-05	2.20E-05	3.20E-04	3.20E-01	2.50E-02	7.00E-01	2.50E-01
143-50-0	SVOCs	chlordecone (kepone)						5.40E-04		5.40E-03
16887-00-6	Nutrients	chloride								
90982-32-4	Pesticides	chlorimuron-ethyl								
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS				6.90E-02		1.50E-01	
506-77-4	Cyanides	chlorine cyanide								
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS				9.10E-02		2.00E-01	
7758-19-2	Nutrients	chlorite								
75-68-3	VOCs	chloro-1,1-difluoroethane;1-					2.30E+04		5.00E+04	
126-99-8	VOCs	chloro-1,3-butadiene;2-					9.10E+00	8.30E-03	2.00E+01	8.30E-02
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-								
95-69-2	SVOCs	chloro-2-methylaniline;4-						3.20E-02		3.20E-01
79-11-8	SVOCs	chloroacetic acid								
532-27-4	SVOCs	chloroacetophenone;2-					1.40E-02		3.00E-02	
106-47-8	SVOCs	chloroaniline;p-								
108-90-7	VOCs	chlorobenzene		8.90E+02	2.00E+02	8.00E+02	2.30E+01		5.00E+01	
510-15-6	Pesticides	chlorobenzilate						8.10E-02		8.10E-01
74-11-3	Pesticides	chlorobenzoic acid;p-								
98-56-6	VOCs	chlorobenzotrifluoride;4-					1.40E+02		3.00E+02	
109-69-3	VOCs	chlorobutane;1-								
59-50-7	Phenols	chlorocresol		3.60E+01		2.00E+03				
75-45-6	VOCs	chlorodifluoromethane					2.30E+04		5.00E+04	
67-66-3	VOCs	chloroform	TTHM NOTES	1.20E+03	6.00E+02	2.00E+03	4.50E+01	1.10E-01	9.80E+01	1.10E+00
74-87-3	VOCs	chloromethane					4.10E+01		9.00E+01	
107-30-2	VOCs	chloromethyl methyl ether						3.60E-03		3.60E-02
88-73-3	Pesticides	chloronitrobenzene;o-					4.60E-03		1.00E-02	
100-00-5	Pesticides	chloronitrobenzene;p-					9.10E-01		2.00E+00	
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT	1.70E+01		8.00E+02				
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-								
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-								
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-								
75-29-6	VOCs	chloropropane;2-								
1897-45-6	Pesticides	chlorothalonil						2.80E+00		2.80E+01
95-49-8	VOCs	chlorotoluene;o-								
101-21-3	Pesticides	chlorpropham								
2921-88-2	Pesticides	chlorpyrifos								
5598-13-0	Pesticides	chlorpyrifos-methyl								
64902-72-3	Herbicides	chlorsulfuron								
60238-56-4	Pesticides	chlorthiophos								
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES							
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES							

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	**Surface Water** Human Health Marine Waters 173-201A WAC (µg/L)	**Surface Water** Human Health Marine Waters 40 CFR 131.45 (µg/L)	**Surface Water** Human Health Marine Waters CWA §304 (µg/L)	**Air** Method B Non cancer (µg/m³)	**Air** Method B Cancer (µg/m³)	**Air** Method C Non cancer (µg/m³)	**Air** Method C Cancer (µg/m³)
18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES				4.60E-02	3.00E-05	1.00E-01	3.00E-04
218-01-9	cPAHs	CHRYSENE	PAH NOTES	2.10E+00	1.60E-02	1.30E-01		2.30E-01		2.30E+00
8001-58-9	PAHs	coal tar creosote								
8007-45-2	VOCs	coke oven emissions						4.00E-03		4.00E-02
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT							
544-92-3	Cyanides	copper cyanide								
108-39-4	Phenols	cresol;m-					2.70E+02		6.00E+02	
95-48-7	Phenols	cresol;o-					2.70E+02		6.00E+02	
106-44-5	Phenols	cresol;p-					2.70E+02		6.00E+02	
4170-30-3	VOCs	crotonaldehyde								
98-82-8	VOCs	cumene					1.80E+02		4.00E+02	
21725-46-2	Pesticides	cyanazine								
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES	2.70E+02	1.00E+02	4.00E+02	3.70E-01		8.00E-01	
460-19-5	Cyanides	cyanogen								
506-68-3	Cyanides	cyanogen bromide								
110-82-7	VOCs	cyclohexane					2.70E+03		6.00E+03	
108-94-1	VOCs	cyclohexanone					3.20E+02		7.00E+02	
108-91-8	SVOCs	cyclohexylamine								
542-92-7	SVOCs	cyclopentadiene								
68085-85-8	Pesticides	cyhalothrin/karate								
52315-07-8	Pesticides	cypermethrin								
66215-27-8	Pesticides	cyromazine								
1861-32-1	Herbicides	dacthal								
75-99-0	Herbicides	dalapon, sodium salt								
39515-41-8	Pesticides	danitol								
94-82-6	Herbicides	db;2,4-								
72-54-8	Pesticides	ddd		3.60E-05	7.90E-06	1.20E-04		3.60E-02		3.60E-01
72-55-9	Pesticides	dde		5.10E-05	8.80E-07	1.80E-05		2.60E-02		2.60E-01
50-29-3	Pesticides	ddt		2.50E-05	1.20E-06	3.00E-05		2.60E-02		2.60E-01
1163-19-5	PBDEs	decabromodiphenyl ether								
8065-48-3	Pesticides	demeton								
103-23-1	Phthalates	di(2-ethylhexyl)adipate								
2303-16-4	Pesticides	diallate								
333-41-5	Pesticides	diazinon								
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES	2.10E-03	1.60E-05	1.30E-04		2.10E-03		2.10E-02
132-64-9	PAHs	dibenzofuran								
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-					9.10E-02	4.20E-04	2.00E-01	4.20E-03
631-64-1	SVOCs	dibromoacetic acid								
106-37-6	Pesticides	dibromobenzene;1,4-								
124-48-1	VOCs	dibromochloromethane	TTHM NOTES	3.00E+00	2.20E+00	2.10E+01				
84-74-2	Phthalates	di-butyl phthalate		5.10E+02	8.00E+00	3.00E+01				
1918-00-9	Herbicides	dicamba								
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS							
764-41-0	VOCs	dichloro-2-butene;1,4-						6.00E-04		6.00E-03
79-43-6	SVOCs	dichloroacetic acid								
95-50-1	VOCs	dichlorobenzene;1,2-		2.50E+03	8.00E+02	3.00E+03	9.10E+01		2.00E+02	
541-73-1	VOCs	dichlorobenzene;1,3-		1.60E+01	2.00E+00	1.00E+01				
106-46-7	VOCs	dichlorobenzene;1,4-		5.80E+02	2.00E+02	9.00E+02	3.70E+02	2.30E-01	8.00E+02	2.30E+00
91-94-1	SVOCs	dichlorobenzidine;3,3'-		3.30E-03		1.50E-01		7.40E-03		7.40E-02
75-71-8	VOCs	dichlorodifluoromethane					4.60E+01		1.00E+02	
75-34-3	VOCs	dichloroethane;1,1-						1.60E+00		1.60E+01
107-06-2	VOCs	dichloroethane;1,2-		1.20E+02	7.30E+01	6.50E+02	3.20E+00	9.60E-02	7.00E+00	9.60E-01
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)								
75-35-4	VOCs	dichloroethylene;1,1-		4.10E+03	4.00E+03	2.00E+04	9.10E+01		2.00E+02	
156-59-2	VOCs	dichloroethylene;1,2-,cis								
156-60-5	VOCs	dichloroethylene;1,2-,trans		5.80E+03	1.00E+03	4.00E+03				
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT	3.40E+01	1.00E+01	6.00E+01				

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94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-				1.20E+04				
78-87-5	VOCs	dichloropropane;1,2-		3.10E+00		3.10E+01	1.80E+00	6.80E-01	4.00E+00	6.80E+00
616-23-9	SVOCs	dichloropropanol;2,3-								
542-75-6	VOCs	dichloropropene;1,3-		2.00E+00	1.20E+00	1.20E+01	9.10E+00	6.30E-01	2.00E+01	6.30E+00
62-73-7	Pesticides	dichlorvos					2.30E-01	3.00E-02	5.00E-01	3.00E-01
115-32-2	Pesticides	dicofol								
77-73-6	VOCs	dicyclopentadiene					1.40E-01		3.00E-01	
60-57-1	Pesticides	dieldrin		6.10E-06	7.00E-08	1.20E-06		5.40E-04		5.40E-03
84-66-2	Phthalates	diethyl phthalate		5.00E+03	2.00E+02	6.00E+02				
111-46-6	Glycols	diethylene glycol								
693-21-0	Glycols	diethylene glycol dinitrate								
112-34-5	Glycols	diethylene glycol monobutyl ether					4.60E-02		1.00E-01	
111-90-0	Glycols	diethylene glycol monoethyl ether					1.40E-01		3.00E-01	
617-84-5	SVOCs	diethylformamide								
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate								
56-53-1	SVOCs	diethylstilbesterol						2.50E-05		2.50E-04
43222-48-6	Pesticides	difenzoquat								
35367-38-5	Pesticides	diflubenzuron								
75-37-6	VOCs	difluoroethane;1,1-					1.80E+04		4.00E+04	
1445-75-6	SVOCs	diisopropyl methylphosphonate								
55290-64-7	Pesticides	dimethipin								
60-51-5	Pesticides	dimethoate								
119-90-4	SVOCs	dimethoxybenzidine;3,3'-								
131-11-3	Phthalates	dimethyl phthalate		1.30E+05	6.00E+02	2.00E+03				
120-61-6	Phthalates	dimethyl terephthalate								
124-40-3	VOCs	dimethylamine								
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-								
95-68-1	SVOCs	dimethylaniline;2,4-								
121-69-7	SVOCs	dimethylaniline;N,N-								
119-93-7	SVOCs	dimethylbenzidine;3,3'-								
68-12-2	VOCs	dimethylformamide;N,N-					1.40E+01		3.00E+01	
57-14-7	VOCs	dimethylhydrazine;1,1-					9.10E-04		2.00E-03	
540-73-8	VOCs	dimethylhydrazine;1,2-						1.60E-05		1.60E-04
105-67-9	Phenols	dimethylphenol;2,4-		9.70E+01		3.00E+03				
576-26-1	Phenols	dimethylphenol;2,6-								
95-65-8	Phenols	dimethylphenol;3,4-								
99-65-0	Explosives	dinitrobenzene;m-								
528-29-0	SVOCs	dinitrobenzene;o-								
100-25-4	SVOCs	dinitrobenzene;p-								
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-								
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT	6.10E+02	1.00E+02	3.00E+02				
25550-58-7	Phenols	dinitrophenols				1.00E+03				
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-								
121-14-2	Explosives	dinitrotoluene;2,4-		1.80E-01		1.70E+00		2.80E-02		2.80E-01
606-20-2	Explosives	dinitrotoluene;2,6-								
117-84-0	Phthalates	di-n-octyl phthalate								
88-85-7	Herbicides	dinoseb								
123-91-1	VOCs	dioxane;1,4-					1.40E+01	5.00E-01	3.00E+01	5.00E+00
957-51-7	Pesticides	diphenamid								
122-39-4	SVOCs	diphenylamine								
122-66-7	SVOCs	diphenylhydrazine;1,2-		2.30E-02	2.00E-02	2.00E-01		1.10E-02		1.10E-01
85-00-7	Pesticides	diquat								
1937-37-7	Dyes	direct black 38						1.80E-05		1.80E-04
2602-46-2	Dyes	direct blue 6						1.80E-05		1.80E-04

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16071-86-6	Dyes	direct brown 95						1.80E-05		1.80E-04
2610-05-1	Dyes	direct sky blue								
298-04-4	Pesticides	disulfoton								
505-29-3	SVOCs	dithiane;1,4-								
330-54-1	Pesticides (Carbamate)	diuron								
534-52-1	Phenols	DNOC		2.50E+01	7.00E+00	3.00E+01				
2439-10-3	Pesticides	dodine								
115-29-7	Pesticides	endosulfan								
1031-07-8	Pesticides	endosulfan sulfate		1.00E+01		4.00E+01				
959-98-8	Pesticides	endosulfan;alpha		1.00E+01	7.00E+00	3.00E+01				
33213-65-9	Pesticides	endosulfan;beta		1.00E+01		4.00E+01				
145-73-3	Herbicides	endothall								
72-20-8	Pesticides	endrin		3.50E-02	2.00E-03	3.00E-02				
7421-93-4	Pesticides	endrin aldehyde		3.50E-02		1.00E+00				
106-89-8	VOCs	epichlorohydrin					4.60E-01	2.10E+00	1.00E+00	2.10E+01
106-88-7	VOCs	epoxybutane					9.10E+00		2.00E+01	
16672-87-0	Pesticides	ethephon								
563-12-2	Pesticides	ethion								
111-15-9	VOCs	ethoxyethanol acetate;2-					2.70E+01		6.00E+01	
110-80-5	VOCs	ethoxyethanol;2-					9.10E+01		2.00E+02	
141-78-6	VOCs	ethyl acetate					3.20E+01		7.00E+01	
140-88-5	VOCs	ethyl acrylate					3.70E+00		8.10E+00	
75-00-3	VOCs	ethyl chloride					4.60E+03		1.00E+04	
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-								
60-29-7	VOCs	ethyl ether								
97-63-2	VOCs	ethyl methacrylate					1.40E+02		3.00E+02	
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate								
100-41-4	VOCs	ethylbenzene		2.70E+02	3.10E+01	1.30E+02	4.60E+02		1.00E+03	
109-78-4	SVOCs	ethylene cyanohydrin								
107-15-3	SVOCs	ethylene diamine								
106-93-4	VOCs	ethylene dibromide (EDB)					4.10E+00	4.20E-03	9.00E+00	4.20E-02
107-21-1	VOCs	ethylene glycol					1.80E+02		4.00E+02	
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)					7.30E+02		1.60E+03	
75-21-8	VOCs	ethylene oxide					1.40E+01	8.30E-04	3.00E+01	8.30E-03
96-45-7	SVOCs	ethylene thiourea						1.90E-01		1.90E+00
84-72-0	Phthalates	ethylphthalyl ethylglycolate								
101200-48-0	Pesticides	express								
22224-92-6	Pesticides	fenamiphos								
115-90-2	Pesticides	fensulfothion								
2164-17-2	Pesticides	fluometuron								
206-44-0	PAHs	fluoranthene		1.60E+01	6.00E+00	2.00E+01				
86-73-7	PAHs	fluorene		6.10E+02	1.00E+01	7.00E+01				
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES				5.90E+00		1.30E+01	
59756-60-4	Pesticides	fluridone								
56425-91-3	Pesticides	flurprimidol								
66332-96-5	Pesticides	flutolanil								
69409-94-5	Pesticides	fluvalinate								
133-07-3	Pesticides	folpet								
72178-02-0	Pesticides	fomesafen								
944-22-9	Pesticides	fonofos								
50-00-0	VOCs	formaldehyde					4.50E+00	1.90E-01	9.80E+00	1.90E+00
64-18-6	VOCs	formic acid					1.40E-01		3.00E-01	
39148-24-8	Pesticides	fosetyl-al								
110-00-9	Furans	furan								

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67-45-8	SVOCs	furazolidone								
98-01-1	VOCs	furfural					2.30E+01		5.00E+01	
531-82-8	SVOCs	furium						5.80E-03		5.80E-02
60568-05-0	Pesticides	furmecyclox						2.90E-01		2.90E+00
77182-82-2	SVOCs	glufosinate-ammonium								
765-34-4	VOCs	glycidaldehyde					4.60E-01		1.00E+00	
1071-83-6	SVOCs	glyphosate								
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE							
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE							
86-50-0	Pesticides	guthion					4.60E+00		1.00E+01	
69806-40-2	Pesticides	haloxyfop-methyl								
79277-27-3	Pesticides	harmony								
76-44-8	Pesticides	heptachlor		1.00E-05	3.40E-07	5.90E-06		1.90E-03		1.90E-02
1024-57-3	Pesticides	heptachlor epoxide		7.40E-06	2.40E-06	3.20E-05		9.60E-04		9.60E-03
142-82-5	VOCs	heptane;n-					1.80E+02		3.90E+02	
87-82-1	SVOCs	hexabromobenzene								
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-								
118-74-1	Pesticides	hexachlorobenzene		5.20E-05	5.00E-06	7.90E-05		5.40E-03		5.40E-02
87-68-3	VOCs	hexachlorobutadiene		4.10E+00	1.00E-02	1.00E-02		1.10E-01		1.10E+00
319-84-6	Pesticides	hexachlorocyclohexane;alpha		5.60E-04	4.80E-05	3.90E-04		1.40E-03		1.40E-02
319-85-7	Pesticides	hexachlorocyclohexane;beta-		2.00E-03	1.40E-03	1.40E-02		4.70E-03		4.70E-02
319-86-8	Pesticides	hexachlorocyclohexane;delta-								
608-73-1	SVOCs	hexachlorocyclohexane;technical				1.00E-02		4.90E-03		4.90E-02
77-47-4	Pesticides	hexachlorocyclopentadiene		6.30E+02	1.00E+00	4.00E+00	9.10E-02		2.00E-01	
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture						1.90E-06		1.90E-05
67-72-1	VOCs	hexachloroethane		1.30E-01	2.00E-02	1.00E-01	1.40E+01	2.30E-01	3.00E+01	2.30E+00
70-30-4	SVOCs	hexachlorophene								
822-06-0	VOCs	hexamethylene diisocyanate;1,6-					4.60E-03		1.00E-02	
110-54-3	VOCs	hexane;n-					3.20E+02		7.00E+02	
591-78-6	VOCs	hexanone;2-					1.40E+01		3.00E+01	
51235-04-2	Pesticides	hexazinone								
302-01-2	VOCs	hydrazine					1.40E-02	5.10E-04	3.00E-02	5.10E-03
10034-93-2	SVOCs	hydrazine sulfate						5.10E-04		5.10E-03
7647-01-0	VOCs	hydrogen chloride					9.10E+00		2.00E+01	
74-90-8	Cyanides	hydrogen cyanide					3.70E-01		8.00E-01	
7783-06-4	VOCs	hydrogen sulfide					9.10E-01		2.00E+00	
123-31-9	SVOCs	hydroquinone								
35554-44-0	Pesticides	imazalil								
81335-37-7	Pesticides	imazaquin								
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES	2.10E-02	1.60E-04	1.30E-03		2.30E-02		2.30E-01
36734-19-7	Pesticides	iprodione								
7439-89-6	Metals	iron								
78-83-1	VOCs	isobutyl alcohol								
78-59-1	SVOCs	isophorone		1.10E+02		1.80E+03	9.10E+02		2.00E+03	
33820-53-0	Pesticides	isopropalin								
1832-54-8	SVOCs	isopropyl methyl phosphonic acid								
82558-50-7	Pesticides	isoxaben								
77501-63-4	Pesticides	lactofen								
7439-92-1	Metals	LEAD	LEAD NOTES							
unavailable02	Metals	lead alkyls								
58-89-9	Pesticides	lindane		1.70E+01	4.30E-01	4.40E+00		8.10E-03		8.10E-02
330-55-2	Pesticides (Carbamate)	linuron								
7791-03-9	Perchlorates	lithium perchlorate								
83055-99-6	Pesticides	londax								

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121-75-5	Pesticides	malathion								
108-31-6	SVOCs	maleic anhydride					3.20E-01		7.00E-01	
123-33-1	SVOCs	maleic hydrazide								
109-77-3	VOCs	malononitrile								
8018-01-7	Pesticides	mancozeb								
12427-38-2	Pesticides	maneb								
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES			1.00E+02	2.30E-02		5.00E-02	
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES			1.00E+02	2.30E-02		5.00E-02	
950-10-7	Pesticides	mephosfolan								
24307-26-4	Pesticides	mepiquat chloride								
7487-94-7	Metals	mercuric chloride					1.40E-01		3.00E-01	
7439-97-6	Metals	mercury					1.40E-01		3.00E-01	
150-50-5	Pesticides	merphos								
57837-19-1	Pesticides	metalaxyl								
126-98-7	VOCs	methacrylonitrile					1.40E+01		3.00E+01	
10265-92-6	Pesticides	methamidosphos								
67-56-1	VOCs	methanol					9.10E+03		2.00E+04	
950-37-8	Pesticides	methidathion								
16752-77-5	Pesticides (Carbamate)	methomyl								
99-59-2	SVOCs	methoxy-5-nitroaniline;2-						1.80E-01		1.80E+00
72-43-5	Pesticides	methoxychlor				2.00E-02				
110-49-6	VOCs	methoxyethanol acetate;2-					4.60E-01		1.00E+00	
109-86-4	VOCs	methoxyethanol;2-					9.10E+00		2.00E+01	
79-20-9	VOCs	methyl acetate								
96-33-3	VOCs	methyl acrylate					9.10E+00		2.00E+01	
78-93-3	VOCs	methyl ethyl ketone					2.30E+03		5.00E+03	
108-10-1	VOCs	methyl isobutyl ketone					1.40E+03		3.00E+03	
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES	1.00E+00	3.00E-02	3.00E-01				
80-62-6	VOCs	methyl methacrylate					3.20E+02		7.00E+02	
90-12-0	PAHs	methyl naphthalene;1-								
91-57-6	PAHs	methyl naphthalene;2-								
298-00-0	Pesticides	methyl parathion								
25013-15-4	VOCs	methyl styrene					1.80E+01		4.00E+01	
98-83-9	SVOCs	methyl styrene, alpha								
1634-04-4	VOCs	methyl tert-butyl ether					1.40E+03	9.60E+00	3.00E+03	9.60E+01
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-								
99-55-8	SVOCs	methyl-5-nitroaniline;2-								
636-21-5	SVOCs	methylaniline hydrochloride;2-						6.80E-02		6.80E-01
95-53-4	VOCs	methylaniline;2-						4.90E-02		4.90E-01
108-87-2	VOCs	methylcyclohexane								
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-						5.80E-03		5.80E-02
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-						1.90E-01		1.90E+00
74-95-3	VOCs	methylene bromide					1.80E+00		4.00E+00	
75-09-2	VOCs	methylene chloride		2.50E+02	1.00E+02	1.00E+03	2.70E+02	2.50E+02	6.00E+02	2.50E+03
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)					2.70E-01		6.00E-01	
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)					2.70E-01		6.00E-01	
101-77-9	SVOCs	methylenebisbenzenamine;4,4-					9.10E+00	5.40E-03	2.00E+01	5.40E-02
60-34-4	VOCs	methylhydrazine					9.10E-03	2.50E-03	2.00E-02	2.50E-02
51218-45-2	Pesticides	metolachlor								
21087-64-9	Pesticides	metribuzin								
7786-34-7	Pesticides	mevinphos								
2385-85-5	Pesticides	mirex						4.90E-04		4.90E-03
2212-67-1	Pesticides	molinate								
7439-98-7	Metals	molybdenum								

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10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS							
unavailable03	SVOCs	monochlorobutanes (not in HSDB)								
300-76-5	Pesticides	naled								
91-20-3	PAHs	naphthalene					1.40E+00	7.40E-02	3.00E+00	7.40E-01
15299-99-7	Pesticides	napropamide								
104-51-8	VOCs	n-butylbenzene								
2429-74-5	Dyes	niagara blue 4B								
unavailable04	Metals	nickel refinery dust					6.40E-03	1.00E-02	1.40E-02	1.00E-01
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT	1.90E+02	1.00E+02	4.60E+03	4.10E-02	9.60E-03	9.00E-02	9.60E-02
12035-72-2	Metals	nickel subsulfide					6.40E-03	5.20E-03	1.40E-02	5.20E-02
14797-55-8	Nutrients	nitrate								
10102-43-9	Gases	nitric oxide								
14797-65-0	Nutrients	nitrite								
88-74-4	SVOCs	nitroaniline, 2-					2.30E-02		5.00E-02	
100-01-6	SVOCs	nitroaniline, 4-					2.70E+00		6.00E+00	
98-95-3	Explosives	nitrobenzene		3.20E+02	1.00E+02	6.00E+02	4.10E+00	6.30E-02	9.00E+00	6.30E-01
67-20-9	SVOCs	nitrofurantoin								
59-87-0	SVOCs	nitrofurazone						6.80E-03		6.80E-02
10102-44-0	Gases	nitrogen dioxide								
556-88-7	SVOCs	nitroguanidine								
79-46-9	VOCs	nitropropane;2-					9.10E+00	9.30E-04	2.00E+01	9.30E-03
1116-54-7	SVOCs	nitrosodiethanolamine;N-						3.10E-03		3.10E-02
55-18-5	SVOCs	nitrosodiethylamine;N-				1.20E+00		5.80E-05		5.80E-04
62-75-9	SVOCs	nitrosodimethylamine;N-		3.40E-01		3.00E+00	1.80E-02	1.80E-04	4.00E-02	1.80E-03
924-16-3	VOCs	nitroso-di-n-butylamine;N-				2.20E-01		1.60E-03		1.60E-02
621-64-7	SVOCs	nitroso-di-n-propylamine;N-		5.80E-02		5.10E-01		1.30E-03		1.30E-02
86-30-6	SVOCs	nitrosodiphenylamine;N-		6.90E-01		6.00E+00		9.60E-01		9.60E+00
4549-40-0	SVOCs	nitrosomethylvinylamine,n-								
759-73-9	SVOCs	nitroso-n-ethylurea;n-						3.20E-04		3.20E-03
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-						4.00E-04		4.00E-03
684-93-5	SVOCs	nitroso-n-methylurea,n-						7.40E-05		7.40E-04
930-55-2	SVOCs	nitrosopyrrolidine;N-				3.40E+01		4.10E-03		4.10E-02
99-08-1	Explosives	nitrotoluene, m-								
88-72-2	Explosives	nitrotoluene, o-								
99-99-0	Explosives	nitrotoluene, p-								
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-								
84852-15-3	Phenols	nonylphenol								
27314-13-2	Pesticides	norflurazon								
85509-19-9	Herbicides	nustar								
32536-52-0	PBDEs	octabromodiphenyl ether								
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine								
152-16-9	SVOCs	octamethylpyrophosphoramide								
19044-88-3	Pesticides	oryzalin								
19666-30-9	Pesticides	oxadiazon								
23135-22-0	Pesticides (Carbamate)	oxamyl								
42874-03-3	Pesticides	oxyfluorfen								
76738-62-0	Herbicides	paclobutrazol								
unavailable05	PAHs	PAHs	PAH NOTES							
4685-14-7	Pesticides	paraquat								
56-38-2	Pesticides	parathion								
1114-71-2	Pesticides	pebulate								
40487-42-1	Pesticides	pendimethalin								
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-								
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-								

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32534-81-9	PBDEs	pentabromodiphenyl ethers								
608-93-5	SVOCs	pentachlorobenzene				1.00E-01				
82-68-8	Pesticides	pentachloronitrobenzene								
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT	1.00E-01	2.00E-03	4.00E-02		4.90E-01		4.90E+00
14797-73-0	Perchlorates	perchlorate and perchlorate salts								
52645-53-1	Pesticides	permethrin								
72-56-0	Pesticides	perthane								
unavailable19	General Chemistry	pH	pH NOTES							
85-01-8	PAHs	phenanthrene								
13684-63-4	Pesticides	phenmedipham								
108-95-2	Phenols	phenol		2.00E+05	7.00E+04	3.00E+05	9.10E+01		2.00E+02	
106-50-3	SVOCs	phenylenediamine, p-								
108-45-2	SVOCs	phenylenediamine;m-								
95-54-5	SVOCs	phenylenediamine;o-								
62-38-4	Metals (organometallic)	phenylmercuric acetate								
90-43-7	Phenols	phenylphenol;2-								
298-02-2	Pesticides	phorate								
75-44-5	VOCs	phosgene					1.40E-01		3.00E-01	
732-11-6	Pesticides	phosmet								
7803-51-2	Gases	phosphine					1.40E-01		3.00E-01	
7664-38-2	SVOCs	phosphoric acid					4.60E+00		1.00E+01	
7723-14-0	Metals	phosphorus								
100-21-0	Phthalates	phthalic acid;p-								
85-44-9	Phthalates	phthalic anhydride					9.10E+00		2.00E+01	
1918-02-1	Herbicides	picloram								
29232-93-7	Pesticides	pirimiphos-methyl								
59536-65-1	PBBs	polybrominated biphenyls						2.90E-04		2.90E-03
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)		1.70E-04	7.00E-06	6.40E-05		4.40E-03		4.40E-02
151-50-8	Cyanides	potassium cyanide								
7778-74-7	Perchlorates	potassium perchlorate								
506-61-6	Cyanides	potassium silver cyanide								
67747-09-5	Pesticides	prochloraz (not in HSDB)								
26399-36-0	Pesticides	profluralin								
1610-18-0	Pesticides	prometon								
7287-19-6	Pesticides	prometryn								
23950-58-5	Pesticides	pronamide								
1918-16-7	Pesticides	propachlor								
709-98-8	Pesticides	propanil								
2312-35-8	Pesticides	propargite								
107-19-7	VOCs	propargyl alcohol								
139-40-2	Pesticides	propazine								
122-42-9	Pesticides	propham								
60207-90-1	Pesticides	propiconazole								
123-38-6	VOCs	propionaldehyde					3.70E+00		8.10E+00	
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-								
103-65-1	VOCs	propylbenzene;n-					4.60E+02		1.00E+03	
57-55-6	Glycols	propylene glycol								
6423-43-4	Glycols	propylene glycol dinitrate;1,2-					1.20E-01		2.70E-01	
52125-53-8	Glycols	propylene glycol monoethyl ether								
107-98-2	Glycols	propylene glycol monomethyl ether					9.10E+02		2.00E+03	
75-56-9	VOCs	propylene oxide					1.40E+01	6.80E-01	3.00E+01	6.80E+00
81335-77-5	Pesticides	pursuit								
51630-58-1	Pesticides	pydrin								
129-00-0	PAHs	pyrene		4.60E+02	8.00E+00	3.00E+01				

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110-86-1	VOCs	pyridine								
13593-03-8	Pesticides	quinalphos								
91-22-5	SVOCs	quinoline								
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE							
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES							
121-82-4	Explosives	rdx								
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE				4.80E+01		1.10E+02	
10453-86-8	Pesticides	resmethrin								
299-84-3	Pesticides	ronnel								
83-79-4	Pesticides	rotenone								
78-48-8	Pesticides	s,s;s-tributylphosphorotrithioate								
78587-05-0	Pesticides	savey								
135-98-8	VOCs	sec-butylbenzene								
7783-00-8	Metals	selenious acid								
7782-49-2	Metals	selenium and compounds		4.80E+02	2.00E+02	4.20E+03	9.10E+00		2.00E+01	
630-10-4	Metals (organometallic)	selenourea								
74051-80-2	Pesticides	sethoxydim								
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT							
506-64-9	Cyanides	silver cyanide								
122-34-9	Pesticides	simazine								
26628-22-8	Metals	sodium azide								
143-33-9	Cyanides	sodium cyanide								
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate								
62-74-8	Metals (organometallic)	sodium fluoroacetate								
13718-26-8	Metals	sodium metavanadate								
7601-89-0	Perchlorates	sodium perchlorate								
7440-24-6	Metals	strontium								
57-24-9	SVOCs	strychnine								
100-42-5	VOCs	styrene					4.60E+02		1.00E+03	
unavailable17	Metals	sulfate								
88671-89-0	Pesticides	systhane								
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES	6.40E-08	1.40E-08	5.10E-09	1.80E-05	6.60E-08	4.00E-05	6.60E-07
34014-18-1	Pesticides	tebuthiuron								
3383-96-8	Pesticides	temephos								
5902-51-2	Pesticides	terbacil								
13071-79-9	SVOCs	terbufos								
886-50-0	Pesticides	terbutryn								
98-06-6	VOCs	tert-butylbenzene								
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'								
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-				3.00E-02				
630-20-6	VOCs	tetrachloroethane;1,1,1,2-						3.40E-01		3.40E+00
79-34-5	VOCs	tetrachloroethane;1,1,2,2-		4.60E-01	3.00E-01	3.00E+00		4.30E-02		4.30E-01
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES	7.10E+00	2.90E+00	2.90E+01	1.80E+01	9.60E+00	4.00E+01	9.60E+01
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT							
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-								
961-11-5	Pesticides	tetrachlorvinphos								
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate								
78-00-2	Metals (organometallic)	tetraethyl lead								
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-					3.70E+04		8.00E+04	
109-99-9	Furans	tetrahydrofuran					9.10E+02		2.00E+03	
1314-32-5	Metals	thallic oxide								
563-68-8	Metals	thallium acetate								
6533-73-9	Metals	thallium carbonate								
7791-12-0	Metals	thallium chloride								

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10102-45-1	Metals	thallium nitrate								
12039-52-0	Metals	thallium selenite								
7446-18-6	Metals	thallium(I) sulfate								
7440-28-0	Metals	thallium, soluble salts		2.70E-01	6.30E+00	4.70E-01				
28249-77-6	Pesticides	thiobencarb								
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-								
39196-18-4	Pesticides	thiofanox								
23564-05-8	Pesticides	thiophanate-methyl								
137-26-8	Pesticides	thiram								
7440-31-5	Metals	tin								
118-96-7	Explosives	tnt								
108-88-3	VOCs	toluene		4.10E+02	1.30E+02	5.20E+02	2.30E+03		5.00E+03	
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-						2.30E-01		2.30E+00
584-84-9	VOCs	toluene-2,4-diisocyanate					3.70E-03	2.30E-01	8.00E-03	2.30E+00
91-08-7	VOCs	toluene-2,6-diisocyanate					3.70E-03	2.30E-01	8.00E-03	2.30E+00
95-80-7	SVOCs	toluenediamine;2,4-								
95-70-5	SVOCs	toluenediamine;2,5-								
823-40-5	SVOCs	toluenediamine;2,6-								
106-49-0	SVOCs	toluidine;p-								
unavailable18	General Chemistry	total dissolved solids								
8001-35-2	Pesticides	toxaphene		3.20E-05		7.10E-04		7.80E-03		7.80E-02
93-72-1	Herbicides	tp;2,4,5-				4.00E+02				
unavailable09	Petroleum	tph, diesel range organics								
unavailable10	Petroleum	tph, heavy oils								
unavailable11	Petroleum	tph, mineral oils								
unavailable25	Petroleum	tph: gasoline range organics, benzene present								
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene								
66841-25-6	Pesticides	tralomethrin								
2303-17-5	Pesticides	triallate								
82097-50-5	Pesticides	triasulfuron								
615-54-3	VOCs	tribromobenzene;1,2,4-								
688-73-3	Organotins	tributyltin								
56-35-9	Organotins	tributyltin oxide								
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS							
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-					2.30E+03		5.00E+03	
76-03-9	SVOCs	trichloroacetic acid								
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-								
634-93-5	SVOCs	trichloroaniline;2,4,6-								
120-82-1	VOCs	trichlorobenzene;1,2,4-		1.40E-01	3.70E-02	7.60E-02	9.10E-01		2.00E+00	
71-55-6	VOCs	trichloroethane;1,1,1-		1.60E+05	5.00E+04	2.00E+05	2.30E+03		5.00E+03	
79-00-5	VOCs	trichloroethane;1,1,2-		1.80E+00	9.00E-01	8.90E+00	9.10E-02	1.60E-01	2.00E-01	1.60E+00
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES	8.60E-01	7.00E-01	7.00E+00	9.10E-01	3.70E-01	2.00E+00	6.30E+00
75-69-4	VOCs	trichlorofluoromethane					3.20E+02		7.00E+02	
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT			6.00E+02				
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT	2.80E-01		2.80E+00		8.10E-01		8.10E+00
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-								
598-77-6	VOCs	trichloropropane;1,1,2-								
96-18-4	VOCs	trichloropropane;1,2,3-					1.40E-01		3.00E-01	
96-19-5	VOCs	trichloropropene;1,2,3-					1.40E-01		3.00E-01	
58138-08-2	Pesticides	tridiphane								
121-44-8	VOCs	triethylamine					3.20E+00		7.00E+00	
1582-09-8	Pesticides	trifluralin								
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES							
512-56-1	SVOCs	trimethyl phosphate								
526-73-8	VOCs	trimethylbenzene;1,2,3-					2.70E+01		6.00E+01	
95-63-6	VOCs	trimethylbenzene;1,2,4-					2.70E+01		6.00E+01	
108-67-8	VOCs	trimethylbenzene;1,3,5-					2.70E+01		6.00E+01	

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Surface Water Human Health Marine Waters 173-201A WAC (µg/L)	Surface Water Human Health Marine Waters 40 CFR 131.45 (µg/L)	Surface Water Human Health Marine Waters CWA §304 (µg/L)	Air Method B Non cancer (µg/m³)	Air Method B Cancer (µg/m³)	Air Method C Non cancer (µg/m³)	Air Method C Cancer (µg/m³)
99-35-4	Explosives	trinitrobenzene;1,3,5-								
479-45-8	Explosives	trinitrophenylmethylnitramine								
unavailable12	Radionuclides	uranium, soluble salts					1.80E-02		4.00E-02	
7440-62-2	Metals	vanadium					4.60E-02		1.00E-01	
1314-62-1	Metals	vanadium pentoxide					3.20E-03	3.00E-04	7.00E-03	3.00E-03
27774-13-6	Metals	vanadyl sulfate								
1929-77-7	Pesticides	vernam								
50471-44-8	Pesticides	vinclozolin								
108-05-4	VOCs	vinyl acetate					9.10E+01		2.00E+02	
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES	2.60E-01	1.80E-01	1.60E+00	4.60E+01	2.80E-01	1.00E+02	2.80E+00
81-81-2	Pesticides	warfarin								
8012-95-1	Petroleum	white mineral oil								
108-38-3	VOCs	xylene;m-					4.60E+01		1.00E+02	
95-47-6	VOCs	xylene;o-					4.60E+01		1.00E+02	
106-42-3	VOCs	xylene;p-					4.60E+01		1.00E+02	
1330-20-7	VOCs	xylenes					4.60E+01		1.00E+02	
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT	2.90E+03	1.00E+03	2.60E+04				
557-21-1	Cyanides	zinc cyanide								
1314-84-7	Metals	zinc phosphide								
12122-67-7	Pesticides	zineb								

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	S (Aqueous Solubility) (mg/L)	BCF (Bioconcen-tration Factor) (L/kg)	Hcc (Henry's Law Constant) 25 degrees C (unitless)	Hcc (Henry's Law Constant @ 13 degrees C) (unitless)	INH (Inhalation Correction Factor) (unitless)	Kd (Distribution Factor for metals) (L/kg)	Koc (Soil Organic Carbon-Water Partitioning Coefficient) (L/kg)	Kd (Distribution Factor for metals and non-ionizing organics) (L/kg)	GI Absorption Fraction (unitless)	Ground Water Target Cleanup Level for Soil to Groundwater Pathway see guidance (µg/L)	Ground Water Target Criterion see guidance
83-32-9	PAHs	acenaphthene		4.24E+00	2.42E+02	6.36E-03	2.11E-03	1		4.90E+03	4.90E+00	1	9.60E+02	N
208-96-8	PAHs	acenaphthylene						1				1		
30560-19-1	Pesticides	acephate						1				1		
75-07-0	VOCs	acetaldehyde					2.15E-03	2				1		
34256-82-1	Pesticides	acetochlor						1				1		
67-64-1	VOCs	acetone		1.00E+06		1.59E-03	9.68E-04	2		5.75E-01	5.75E-04	1	7.20E+03	N
75-86-5	VOCs	acetone cyanohydrin						2				1		
75-05-8	VOCs	acetonitrile					8.37E-04	2				1		
98-86-2	SVOCs	acetophenone					1.61E-04	2				1		
62476-59-9	Herbicides	acifluorfen, sodium						2				1		
107-02-8	VOCs	acrolein					3.11E-03	2				1		
79-06-1	VOCs	acrylamide						2				1		
79-10-7	VOCs	acrylic acid						2				1		
107-13-1	VOCs	acrylonitrile			3.00E+01		2.34E-03	2				1		
15972-60-8	Pesticides	alachlor						1				1		
1596-84-5	Pesticides	alar						1				1		
116-06-3	Pesticides (Carbamate)	aldicarb						1				1		
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone						1				1		
309-00-2	Pesticides	aldrin		1.80E-01	4.67E+03	6.97E-03	1.60E-03	2		4.87E+04	4.87E+01	1	2.60E-03	C
74223-64-6	Pesticides	ally						1				1		
107-18-6	VOCs	allyl alcohol						2				1		
107-05-1	VOCs	allyl chloride						2				1		
7429-90-5	Metals	aluminum				0.00E+00	0.00E+00	1				1		
20859-73-8	Metals	aluminum phosphide						1				1		
67485-29-4	Pesticides	amdro						1				1		
834-12-8	Pesticides	ametryn						1				1		
591-27-5	Phenols	aminophenol;m-						1				1		
504-24-5	SVOCs	aminopyridine;4-						1				1		
33089-61-1	Pesticides	amitraz						1				1		
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES					2				1		
7790-98-9	Perchlorates	ammonium perchlorate						1				1		
7773-06-0	Pesticides	ammonium sulfamate						1				1		
62-53-3	SVOCs	aniline						2				1		
120-12-7	PAHs	anthracene		4.34E-02	3.00E+01	2.67E-03	7.56E-04	1		2.35E+04	2.35E+01	1	4.80E+03	N
7440-36-0	Metals	antimony			1.00E+00	0.00E+00	0.00E+00	1	4.50E+01		4.50E+01	1	6.00E+00	MCL
1314-60-9	Metals	antimony pentoxide						1				1		
28300-74-5	Metals	antimony potassium tartrate						1				1		
1332-81-6	Metals	antimony tetroxide						1				1		
1309-64-4	Metals	antimony trioxide						1				1		
74115-24-5	Pesticides	apollo						1				1		
140-57-8	SVOCs	aramite						1				1		
12674-11-2	PCBs	aroclor 1016			3.12E+04			1		1.07E+05	1.07E+02	1		
11097-69-1	PCBs	aroclor 1254			3.12E+04			1				1		
11096-82-5	PCBs	aroclor 1260						1		8.22E+05	8.22E+02	1		
7440-38-2	Metals	arsenic, inorganic			4.40E+01	0.00E+00	0.00E+00	1	2.90E+01		2.90E+01	1	5.00E+00	Background
7784-42-1	Metals	arsine						2				1		
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE					1				1		
76578-14-8	Pesticides	assure						1				1		
3337-71-1	Pesticides	asulam						1				1		
1912-24-9	Pesticides	atrazine						1				1		
65195-55-3	Pesticides	avermectin B1						1				1		
103-33-3	Pesticides	azobenzene						1				1		
7440-39-3	Metals	barium and compounds				0.00E+00	0.00E+00	1	4.10E+01		4.10E+01	1	2.00E+03	MCL
542-62-1	Metals	barium cyanide						1				1		

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	S (Aqueous Solubility) (mg/L)	BCF (Bioconcen-tration Factor) (L/kg)	Hcc (Henry's Law Constant) 25 degrees C (unitless)	Hcc (Henry's Law Constant @ 13 degrees C) (unitless)	INH (Inhalation Correction Factor) (unitless)	Kd (Distribution Factor for metals) (L/kg)	Koc (Soil Organic Carbon-Water Partitioning Coefficient) (L/kg)	Kd (Distribution Factor for metals and non-ionizing organics) (L/kg)	GI Absorption Fraction (unitless)	Ground Water Target Cleanup Level for Soil to Groundwater Pathway see guidance (µg/L)	Ground Water Target Criterion see guidance
114-26-1	Pesticides	baygon						1				1		
43121-43-3	Pesticides	bayleton						1				1		
68359-37-5	Pesticides	baythroid						1				1		
1861-40-1	Pesticides	benefin						2				1		
17804-35-2	Pesticides	benomyl						1				1		
25057-89-0	Herbicides	bentazon						1				1		
100-52-7	SVOCs	benzaldehyde					3.72E-04	2				1		
71-43-2	VOCs	BENZENE		1.75E+03	5.20E+00	2.28E-01	1.33E-01	2		6.20E+01	6.20E-02	1	5.00E+00	MCL
108-98-5	SVOCs	benzenethiol						2				1		
92-87-5	SVOCs	benzidine			8.75E+01			1				1		
191-24-2	PAHs	benzo(g,h,i)perylene						1				1		
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES	9.40E-03	3.00E+01	1.37E-04	2.79E-05	1		3.58E+05	3.58E+02	1		
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES	1.62E-03	3.00E+01	4.63E-05	6.39E-06	1		9.69E+05	9.69E+02	1	2.00E-01	MCL
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES	1.50E-03	3.00E+01	4.55E-03	7.73E-04	1		1.23E+06	1.23E+03	1		
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES	8.00E-04	3.00E+01	3.40E-05	5.13E-06	1		1.23E+06	1.23E+03	1		
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT	3.50E+03		6.31E-05	4.88E-06	1		6.00E-01	6.00E-04	1	6.40E+04	N
98-07-7	VOCs	benzotrichloride						2				1		
100-51-6	SVOCs	benzyl alcohol						2				1		
100-44-7	VOCs	benzyl chloride					8.25E-03	2				1		
7440-41-7	Metals	beryllium			1.90E+01	0.00E+00	0.00E+00	1	7.90E+02		7.90E+02	1	4.00E+00	MCL
91-58-7	PAHs	beta-chloronaphthalene			2.02E+02			2				1		
141-66-2	SVOCs	bidrin						1				1		
82657-04-3	Pesticides	biphenthrin						1				1		
92-52-4	PAHs	biphenyl;1,1-					4.73E-03	2				1		
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether			2.47E+00			2				1		
111-44-4	SVOCs	bis(2-chloroethyl)ether		1.72E+04	6.90E+00	7.38E-04	2.93E-04	2		7.60E+01	7.60E-02	1	4.00E-02	C
39638-32-9	VOCs	bis(2-chloroisopropyl) ether			2.47E+00			2				1		
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate		3.40E-01	1.30E+02	4.18E-06	6.56E-07	1		1.11E+05	1.11E+02	1	6.00E+00	MCL
542-88-1	VOCs	bis(chloromethyl)ether						2				1		
80-05-7	Phenols	bisphenol a						1				1		
7440-42-8	Metals	boron				0.00E+00	0.00E+00	1				1		
15541-45-4	Pesticides	bromate						1				1		
79-08-3	SVOCs	bromoacetic acid						1				1		
108-86-1	VOCs	bromobenzene		4.46E+02		1.01E-01	4.33E-02	2		2.34E+02	2.34E-01	1	6.40E+01	N
75-27-4	VOCs	bromodichloromethane	TTHM NOTES	6.74E+03	3.75E+00	6.56E-02	3.69E-02	2		5.50E+01	5.50E-02	1	7.10E+00	MCL C ADJ
593-60-2	VOCs	bromoethene						2				1		
75-25-2	VOCs	bromoform	TTHM NOTES	3.10E+03	3.75E+00	2.19E-02	1.16E-02	2		1.26E+02	1.26E-01	1	5.50E+01	MCL C ADJ
74-83-9	VOCs	bromomethane		1.52E+04	3.75E+00	2.56E-01	1.78E-01	2		9.00E+00	9.00E-03	1	1.10E+01	N
2104-96-3	Pesticides	bromophos						1				1		
1689-84-5	Herbicides	bromoxynil						1				1		
1689-99-2	Pesticides	bromoxynil octanoate						1				1		
106-99-0	VOCs	butadiene;1,3-					2.17E+00	2				1		
71-36-3	VOCs	butanol;n-		7.40E+04		3.61E-04	1.55E-04	2		6.92E+00	6.92E-03	1	8.00E+02	N
85-68-7	Phthalates	butyl benzyl phthalate		2.69E+00	4.14E+02	5.17E-05	1.11E-05	1		1.37E+04	1.37E+01	1	4.60E+01	C
2008-41-5	Pesticides	butylate						2				1		
85-70-1	Phthalates	butylphthalyl butylglycolate						1				1		
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-						1				1		
75-60-5	Pesticides	cacodylic acid						1				1		
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES		6.40E+01	0.00E+00	0.00E+00	1	6.70E+00		6.70E+00	1	5.00E+00	MCL
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES		6.40E+01	0.00E+00	0.00E+00	1				1		
592-01-8	Cyanides	calcium cyanide						1				1		
105-60-2	SVOCs	caprolactam						1				1		
2425-06-1	Pesticides	captafol						1				1		
133-06-2	Pesticides	captan						1				1		

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63-25-2	Pesticides (Carbamate)	carbaryl						1				1		
86-74-8	PAHs	carbazole		7.48E+00		6.26E-07	1.63E-07	1		3.39E+03	3.39E+00	1		
1563-66-2	Pesticides (Carbamate)	carbofuran						1				1		
75-15-0	VOCs	carbon disulfide		1.19E+03		1.24E+00	8.03E-01	2		4.57E+01	4.57E-02	1	8.00E+02	N
56-23-5	VOCs	carbon tetrachloride		7.93E+02	1.88E+01	1.25E+00	7.42E-01	2		1.52E+02	1.52E-01	1	5.00E+00	MCL
786-19-6	Pesticides	carbophenothion						1				1		
55285-14-8	Pesticides	carbosulfan						1				1		
5234-68-4	Pesticides	carboxin						1				1		
1306-38-3	Metals	cerium oxide and cerium compounds						1				1		
75-87-6	VOCs	chloral						2				1		
302-17-0	VOCs	chloral hydrate						2				1		
133-90-4	Herbicides	chloramben						1				1		
118-75-2	Pesticides	chloranil						1				1		
12789-03-6	Pesticides	chlordane		5.60E-02	1.41E+04	1.99E-03	5.15E-04	1		5.13E+04	5.13E+01	1	2.00E+00	MCL
143-50-0	SVOCs	chlordecone (kepone)						1				1		
16887-00-6	Nutrients	chloride						1				1		
90982-32-4	Pesticides	chlorimuron-ethyl						1				1		
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS					2				1		
506-77-4	Cyanides	chlorine cyanide						2				1		
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS					2				1		
7758-19-2	Nutrients	chlorite						1				1		
75-68-3	VOCs	chloro-1,1-difluoroethane;1-						2				1		
126-99-8	VOCs	chloro-1,3-butadiene;2-					2.75E-01	2				1		
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-						1				1		
95-69-2	SVOCs	chloro-2-methylaniline;4-						1				1		
79-11-8	SVOCs	chloroacetic acid						1				1		
532-27-4	SVOCs	chloroacetophenone;2-						1				1		
106-47-8	SVOCs	chloroaniline;p-		5.30E+03		1.36E-05	4.85E-06	2		6.61E+01	6.61E-02	1	2.20E-01	C
108-90-7	VOCs	chlorobenzene		4.72E+02	1.03E+01	1.52E-01	7.87E-02	2		2.24E+02	2.24E-01	1	1.00E+02	MCL
510-15-6	Pesticides	chlorobenzilate						1				1		
74-11-3	Pesticides	chlorobenzoic acid;p-						1				1		
98-56-6	VOCs	chlorobenzotrifluoride;4-						2				1		
109-69-3	VOCs	chlorobutane;1-					4.06E-01	2				1		
59-50-7	Phenols	chlorocresol						1				1		
75-45-6	VOCs	chlorodifluoromethane					8.61E-01	2				1		
67-66-3	VOCs	chloroform	TTHM NOTES	7.92E+03	3.75E+00	1.50E-01	9.15E-02	2		5.30E+01	5.30E-02	1	1.40E+01	MCL C ADJ
74-87-3	VOCs	chloromethane			3.75E+00		2.68E-01	2		6.00E+00	6.00E-03	1		
107-30-2	VOCs	chloromethyl methyl ether						2				1		
88-73-3	Pesticides	chloronitrobenzene;o-						1				1		
100-00-5	Pesticides	chloronitrobenzene;p-						2				1		
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT	2.20E+04	1.34E+02	1.60E-02	7.25E-03	2		3.88E+02	3.88E-01	1	4.00E+01	N
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-						1				1		
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-						1				1		
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-						1				1		
75-29-6	VOCs	chloropropane;2-					3.87E-01	2				1		
1897-45-6	Pesticides	chlorothalonil						1				1		
95-49-8	VOCs	chlorotoluene;o-						2				1		
101-21-3	Pesticides	chlorpropham						1				1		
2921-88-2	Pesticides	chlorpyrifos						1				1		
5598-13-0	Pesticides	chlorpyrifos-methyl						1				1		
64902-72-3	Herbicides	chlorsulfuron						1				1		
60238-56-4	Pesticides	chlorthiophos						1				1		
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES					1				1		
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES		1.60E+01	0.00E+00	0.00E+00	1	1.00E+03		1.00E+03	1	2.40E+04	N

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18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES		1.60E+01	0.00E+00	0.00E+00	1	1.90E+01		1.90E+01	1	4.80E+01	N
218-01-9	cPAHs	CHRYSENE	PAH NOTES	1.60E-03	3.00E+01	3.88E-03	7.13E-04	1		3.98E+05	3.98E+02	1		
8001-58-9	PAHs	coal tar creosote						1				1		
8007-45-2	VOCs	coke oven emissions						2				1		
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT		3.60E+01	0.00E+00	0.00E+00	1	2.20E+01		2.20E+01	1	6.40E+02	N
544-92-3	Cyanides	copper cyanide						1				1		
108-39-4	Phenols	cresol;m-						2				1		
95-48-7	Phenols	cresol;o-		2.60E+04		4.92E-05	1.95E-05	2		9.12E+01	9.12E-02	1	4.00E+02	N
106-44-5	Phenols	cresol;p-						2				1		
4170-30-3	VOCs	crotonaldehyde					4.37E-04	2				1		
98-82-8	VOCs	cumene					2.55E-01	2				1		
21725-46-2	Pesticides	cyanazine						1				1		
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES		1.00E+00			1				1		
460-19-5	Cyanides	cyanogen						2				1		
506-68-3	Cyanides	cyanogen bromide						2				1		
110-82-7	VOCs	cyclohexane						1				1		
108-94-1	VOCs	cyclohexanone						2				1		
108-91-8	SVOCs	cyclohexylamine						2				1		
542-92-7	SVOCs	cyclopentadiene						2				1		
68085-85-8	Pesticides	cyhalothrin/karate						1				1		
52315-07-8	Pesticides	cypermethrin						1				1		
66215-27-8	Pesticides	cyromazine						1				1		
1861-32-1	Herbicides	dacthal						1				1		
75-99-0	Herbicides	dalapon, sodium salt						2				1		
39515-41-8	Pesticides	danitol						1				1		
94-82-6	Herbicides	db;2,4-						1				1		
72-54-8	Pesticides	ddd		9.00E-02	5.36E+04	1.64E-04	2.89E-05	1		4.58E+04	4.58E+01	1	3.60E-01	C
72-55-9	Pesticides	dde		1.20E-01	5.36E+04	8.61E-04	1.87E-04	1		8.64E+04	8.64E+01	1	2.60E-01	C
50-29-3	Pesticides	ddt		2.50E-02	5.36E+04	3.32E-04	3.83E-05	1		6.78E+05	6.78E+02	1	2.60E-01	C
1163-19-5	PBDEs	decabromodiphenyl ether			3.20E+00			1				1		
8065-48-3	Pesticides	demeton						1				1		
103-23-1	Phthalates	di(2-ethylhexyl)adipate						1				1		
2303-16-4	Pesticides	diallate						1				1		
333-41-5	Pesticides	diazinon						1				1		
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES	2.49E-03	3.00E+01	6.03E-07	6.03E-07	1		1.79E+06	1.79E+03	1		
132-64-9	PAHs	dibenzofuran					1.71E-04	1				1		
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-						2				1		
631-64-1	SVOCs	dibromoacetic acid						1				1		
106-37-6	Pesticides	dibromobenzene;1,4-						2				1		
124-48-1	VOCs	dibromochloromethane	TTHM NOTES	2.60E+03	3.75E+00	3.21E-02	2.06E-02	2		6.31E+01	6.31E-02	1	5.20E+00	MCL C ADJ
84-74-2	Phthalates	di-butyl phthalate		1.12E+01	8.90E+01	3.85E-08	8.16E-09	1		1.57E+03	1.57E+00	1	1.60E+03	N
1918-00-9	Herbicides	dicamba						1				1		
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS					1				1		
764-41-0	VOCs	dichloro-2-butene;1,4-						2				1		
79-43-6	SVOCs	dichloroacetic acid						1				1		
95-50-1	VOCs	dichlorobenzene;1,2-		1.56E+02	5.56E+01	7.79E-02	3.54E-02	2		3.79E+02	3.79E-01	1	6.00E+02	MCL
541-73-1	VOCs	dichlorobenzene;1,3-					5.98E-02	2				1		
106-46-7	VOCs	dichlorobenzene;1,4-		7.38E+01	5.56E+01	9.96E-02	4.61E-02	2		6.16E+02	6.16E-01	1	7.50E+01	MCL
91-94-1	SVOCs	dichlorobenzidine;3,3'-		3.11E+00	3.12E+02	1.64E-07	2.23E-08	1		7.24E+02	7.24E-01	1	1.90E-01	C
75-71-8	VOCs	dichlorodifluoromethane					8.10E+00	2				1		
75-34-3	VOCs	dichloroethane;1,1-		5.06E+03		2.30E-01	1.41E-01	2		5.30E+01	5.30E-02	1	7.70E+00	C
107-06-2	VOCs	dichloroethane;1,2-		8.52E+03	1.20E+00	4.01E-02	2.28E-02	2		3.80E+01	3.80E-02	1	4.80E+00	MCL C ADJ
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)						2				1		
75-35-4	VOCs	dichloroethylene;1,1-		2.25E+03	5.60E+00	1.07E+00	7.06E-01	2		6.50E+01	6.50E-02	1	7.00E+00	MCL
156-59-2	VOCs	dichloroethylene;1,2-,cis		3.50E+03		1.67E-01	1.00E-01	2		3.55E+01	3.55E-02	1	1.60E+01	N
156-60-5	VOCs	dichloroethylene;1,2-,trans		6.30E+03	1.58E+00	3.85E-01	2.41E-01	2		3.80E+01	3.80E-02	1	1.00E+02	MCL
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT	4.50E+03	4.07E+01	1.30E-04	3.43E-05	2		1.47E+02	1.47E-01	1	2.40E+01	N

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94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-						1				1		
78-87-5	VOCs	dichloropropane;1,2-		2.80E+03	4.11E+00	1.15E-01	6.47E-02	2		4.70E+01	4.70E-02	1	5.00E+00	MCL
616-23-9	SVOCs	dichloropropanol;2,3-						2				1		
542-75-6	VOCs	dichloropropene;1,3-		2.80E+03	1.91E+00	7.26E-01	3.96E-01	2		2.70E+01	2.70E-02	1	4.40E-01	C
62-73-7	Pesticides	dichlorvos						2				1		
115-32-2	Pesticides	dicofol						1				1		
77-73-6	VOCs	dicyclopentadiene						2				1		
60-57-1	Pesticides	dieldrin		1.95E-01	4.67E+03	6.19E-04	1.13E-04	1		2.55E+04	2.55E+01	1	5.50E-03	C
84-66-2	Phthalates	diethyl phthalate		1.08E+03	7.30E+01	1.85E-05	4.70E-06	1		8.20E+01	8.20E-02	1	1.30E+04	N
111-46-6	Glycols	diethylene glycol						1				1		
693-21-0	Glycols	diethylene glycol dinitrate						1				1		
112-34-5	Glycols	diethylene glycol monobutyl ether						2				1		
111-90-0	Glycols	diethylene glycol monoethyl ether						2				1		
617-84-5	SVOCs	diethylformamide						1				1		
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate						1				1		
56-53-1	SVOCs	diethylstilbesterol						1				1		
43222-48-6	Pesticides	difenzoquat						1				1		
35367-38-5	Pesticides	diflubenzuron						1				1		
75-37-6	VOCs	difluoroethane;1,1-						2				1		
1445-75-6	SVOCs	diisopropyl methylphosphonate						2				1		
55290-64-7	Pesticides	dimethipin						1				1		
60-51-5	Pesticides	dimethoate						1				1		
119-90-4	SVOCs	dimethoxybenzidine;3,3'-						1				1		
131-11-3	Phthalates	dimethyl phthalate			3.60E+01			1				1		
120-61-6	Phthalates	dimethyl terephthalate						2				1		
124-40-3	VOCs	dimethylamine						2				1		
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-						1				1		
95-68-1	SVOCs	dimethylaniline;2,4-						2				1		
121-69-7	SVOCs	dimethylaniline;N,N-						2				1		
119-93-7	SVOCs	dimethylbenzidine;3,3'-						1				1		
68-12-2	VOCs	dimethylformamide;N,N-						2				1		
57-14-7	VOCs	dimethylhydrazine;1,1-						2				1		
540-73-8	VOCs	dimethylhydrazine;1,2-						2				1		
105-67-9	Phenols	dimethylphenol;2,4-		7.87E+03	9.38E+01	8.20E-05	3.02E-05	2		2.09E+02	2.09E-01	1	1.60E+02	N
576-26-1	Phenols	dimethylphenol;2,6-						2				1		
95-65-8	Phenols	dimethylphenol;3,4-						2				1		
99-65-0	Explosives	dinitrobenzene;m-						1				1		
528-29-0	SVOCs	dinitrobenzene;o-						1				1		
100-25-4	SVOCs	dinitrobenzene;p-						1				1		
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-						1				1		
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT	2.79E+03	1.50E+00	1.82E-05	1.48E-06	1		1.00E-02	1.00E-05	1	3.20E+01	N
25550-58-7	Phenols	dinitrophenols						1				1		
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-						1				1		
121-14-2	Explosives	dinitrotoluene;2,4-		2.70E+02	3.80E+00	3.80E-06	1.02E-06	1		9.55E+01	9.55E-02	1	2.80E-01	C
606-20-2	Explosives	dinitrotoluene;2,6-		1.82E+02		3.06E-05	8.83E-06	1		6.92E+01	6.92E-02	1	5.80E-02	C
117-84-0	Phthalates	di-n-octyl phthalate		2.00E-02		2.74E-03	5.20E-04	1		8.32E+07	8.32E+04	1	1.60E+02	N
88-85-7	Herbicides	dinoseb						1				1		
123-91-1	VOCs	dioxane;1,4-						2				1		
957-51-7	Pesticides	diphenamid						1				1		
122-39-4	SVOCs	diphenylamine			3.00E+01			1				1		
122-66-7	SVOCs	diphenylhydrazine;1,2-			2.49E+01			1				1		
85-00-7	Pesticides	diquat						1				1		
1937-37-7	Dyes	direct black 38						1				1		
2602-46-2	Dyes	direct blue 6						1				1		

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16071-86-6	Dyes	direct brown 95						1				1		
2610-05-1	Dyes	direct sky blue						1				1		
298-04-4	Pesticides	disulfoton						1				1		
505-29-3	SVOCs	dithiane;1,4-						1				1		
330-54-1	Pesticides (Carbamate)	diuron						1				1		
534-52-1	Phenols	DNOC						1				1		
2439-10-3	Pesticides	dodine						1				1		
115-29-7	Pesticides	endosulfan		5.10E-01	2.70E+02	4.59E-04	1.14E-04	1		2.04E+03	2.04E+00	1	9.60E+01	N
1031-07-8	Pesticides	endosulfan sulfate						1				1		
959-98-8	Pesticides	endosulfan;alpha						1				1		
33213-65-9	Pesticides	endosulfan;beta						1				1		
145-73-3	Herbicides	endothall						1				1		
72-20-8	Pesticides	endrin		2.50E-01	3.97E+03	3.08E-04	6.63E-05	1		1.08E+04	1.08E+01	1	2.00E+00	MCL
7421-93-4	Pesticides	endrin aldehyde						1				1		
106-89-8	VOCs	epichlorohydrin						2				1		
106-88-7	VOCs	epoxybutane						2				1		
16672-87-0	Pesticides	ethephon						1				1		
563-12-2	Pesticides	ethion						1				1		
111-15-9	VOCs	ethoxyethanol acetate;2-						2				1		
110-80-5	VOCs	ethoxyethanol;2-						2				1		
141-78-6	VOCs	ethyl acetate					3.19E-03	2				1		
140-88-5	VOCs	ethyl acrylate						2				1		
75-00-3	VOCs	ethyl chloride					2.47E-01	2				1		
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-						2				1		
60-29-7	VOCs	ethyl ether					8.76E-01	2				1		
97-63-2	VOCs	ethyl methacrylate					1.42E-02	2				1		
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate						1				1		
100-41-4	VOCs	ethylbenzene		1.69E+02	3.75E+01	3.23E-01	1.62E-01	2		2.04E+02	2.04E-01	1	7.00E+02	MCL
109-78-4	SVOCs	ethylene cyanohydrin						2				1		
107-15-3	SVOCs	ethylene diamine						2				1		
106-93-4	VOCs	ethylene dibromide (EDB)					1.54E-02	2		6.60E+01	6.60E-02	1		
107-21-1	VOCs	ethylene glycol						2				1		
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)						2				1		
75-21-8	VOCs	ethylene oxide					1.54E-02	2				1		
96-45-7	SVOCs	ethylene thiourea						1				1		
84-72-0	Phthalates	ethylphthalyl ethylglycolate						1				1		
101200-48-0	Pesticides	express						1				1		
22224-92-6	Pesticides	fenamiphos						1				1		
115-90-2	Pesticides	fensulfothion						1				1		
2164-17-2	Pesticides	fluometuron						1				1		
206-44-0	PAHs	fluoranthene		2.06E-01	1.15E+03	6.60E-04	1.66E-04	1		4.91E+04	4.91E+01	1	6.40E+02	N
86-73-7	PAHs	fluorene		1.98E+00	3.00E+01	2.61E-03	8.58E-04	1		7.71E+03	7.71E+00	1	6.40E+02	N
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES					1				1		
59756-60-4	Pesticides	fluridone						1				1		
56425-91-3	Pesticides	flurprimidol						1				1		
66332-96-5	Pesticides	flutolanil						1				1		
69409-94-5	Pesticides	fluvalinate						1				1		
133-07-3	Pesticides	folpet						1				1		
72178-02-0	Pesticides	fomesafen						1				1		
944-22-9	Pesticides	fonofos						1				1		
50-00-0	VOCs	formaldehyde						2				1		
64-18-6	VOCs	formic acid						2				1		
39148-24-8	Pesticides	fosetyl-al						1				1		
110-00-9	Furans	furan					1.43E-01	2				1		

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

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67-45-8	SVOCs	furazolidone						1				1		
98-01-1	VOCs	furfural						2				1		
531-82-8	SVOCs	furium						1				1		
60568-05-0	Pesticides	furmecyclox						1				1		
77182-82-2	SVOCs	glufosinate-ammonium						1				1		
765-34-4	VOCs	glycidaldehyde						2				1		
1071-83-6	SVOCs	glyphosate						1				1		
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE					1				1		
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE					1				1		
86-50-0	Pesticides	guthion						1				1		
69806-40-2	Pesticides	haloxyfop-methyl						1				1		
79277-27-3	Pesticides	harmony						1				1		
76-44-8	Pesticides	heptachlor		1.80E-01	1.12E+04	4.47E-02	1.27E-02	1		9.53E+03	9.53E+00	1	1.90E-01	MCL C ADJ
1024-57-3	Pesticides	heptachlor epoxide		2.00E-01	1.12E+04	3.90E-04	8.01E-05	2		8.32E+04	8.32E+01	1	4.80E-02	MCL C ADJ
142-82-5	VOCs	heptane;n-						2				1		
87-82-1	SVOCs	hexabromobenzene						1				1		
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-						1				1		
118-74-1	Pesticides	hexachlorobenzene		6.20E+00	8.69E+03	5.41E-02	1.36E-02	1		8.00E+04	8.00E+01	1	5.50E-01	MCL C ADJ
87-68-3	VOCs	hexachlorobutadiene		3.23E+00	2.78E+00	3.34E-01	1.41E-01	2		5.37E+04	5.37E+01	1	5.60E-01	C
319-84-6	Pesticides	hexachlorocyclohexane;alpha		2.00E+00	1.30E+02	4.35E-04	1.02E-04	1		1.76E+03	1.76E+00	1	1.40E-02	C
319-85-7	Pesticides	hexachlorocyclohexane;beta-		2.40E-01	1.30E+02	3.05E-05	4.81E-06	1		2.14E+03	2.14E+00	1	4.90E-02	C
319-86-8	Pesticides	hexachlorocyclohexane;delta-						1				1		
608-73-1	SVOCs	hexachlorocyclohexane;technical						1				1		
77-47-4	Pesticides	hexachlorocyclopentadiene		1.80E+00	4.34E+00	1.11E+00	4.18E-01	2		2.00E+05	2.00E+02	1	4.80E+01	N
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture						1				1		
67-72-1	VOCs	hexachloroethane		5.00E+01	8.69E+01	1.59E-01	7.24E-02	2		1.78E+03	1.78E+00	1	1.10E+00	C
70-30-4	SVOCs	hexachlorophene						1				1		
822-06-0	VOCs	hexamethylene diisocyanate;1,6-						2				1		
110-54-3	VOCs	hexane;n-		9.50E+00		7.40E+01	4.11E+01	2		3.41E+03	3.41E+00	1	4.80E+02	N
591-78-6	VOCs	hexanone;2-						2				1		
51235-04-2	Pesticides	hexazinone						1				1		
302-01-2	VOCs	hydrazine						2				1		
10034-93-2	SVOCs	hydrazine sulfate						1				1		
7647-01-0	VOCs	hydrogen chloride						2				1		
74-90-8	Cyanides	hydrogen cyanide					3.47E-03	2				1		
7783-06-4	VOCs	hydrogen sulfide						2				1		
123-31-9	SVOCs	hydroquinone						1				1		
35554-44-0	Pesticides	imazalil						1				1		
81335-37-7	Pesticides	imazaquin						1				1		
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES	2.20E-05	3.00E+01	6.56E-05	8.40E-06	1		3.47E+06	3.47E+03	1		
36734-19-7	Pesticides	iprodione						1				1		
7439-89-6	Metals	iron				0.00E+00	0.00E+00	1				1		
78-83-1	VOCs	isobutyl alcohol					1.98E-04	2				1		
78-59-1	SVOCs	isophorone		1.20E+04	4.38E+00	2.72E-04	1.10E-04	2		4.68E+01	4.68E-02	1	4.60E+01	C
33820-53-0	Pesticides	isopropalin						1				1		
1832-54-8	SVOCs	isopropyl methyl phosphonic acid						1				1		
82558-50-7	Pesticides	isoxaben						1				1		
77501-63-4	Pesticides	lactofen						1				1		
7439-92-1	Metals	LEAD	LEAD NOTES			0.00E+00	0.00E+00	1	1.00E+04		1.00E+04	1	1.50E+01	MCL
unavailable02	Metals	lead alkyls						1				1		
58-89-9	Pesticides	lindane		6.80E+00	1.30E+02	5.74E-04	1.34E-04	1		1.35E+03	1.35E+00	1	2.00E-01	MCL
330-55-2	Pesticides (Carbamate)	linuron						1				1		
7791-03-9	Perchlorates	lithium perchlorate						1				1		
83055-99-6	Pesticides	londax						1				1		

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121-75-5	Pesticides	malathion						1				1		
108-31-6	SVOCs	maleic anhydride						2				1		
123-33-1	SVOCs	maleic hydrazide						1				1		
109-77-3	VOCs	malononitrile						2				1		
8018-01-7	Pesticides	mancozeb						1				1		
12427-38-2	Pesticides	maneb						1				1		
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES			0.00E+00	0.00E+00	1				1		
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES											
950-10-7	Pesticides	mephosfolan						1				1		
24307-26-4	Pesticides	mepiquat chloride						1				1		
7487-94-7	Metals	mercuric chloride						1				1		
7439-97-6	Metals	mercury				4.70E-01	4.70E-01	1	5.20E+01		5.20E+01	1	2.00E+00	MCL
150-50-5	Pesticides	merphos						1				1		
57837-19-1	Pesticides	metalaxyl						1				1		
126-98-7	VOCs	methacrylonitrile					5.70E-03	2				1		
10265-92-6	Pesticides	methamidosphos						1				1		
67-56-1	VOCs	methanol						2				1		
950-37-8	Pesticides	methidathion						1				1		
16752-77-5	Pesticides (Carbamate)	methomyl						1				1		
99-59-2	SVOCs	methoxy-5-nitroaniline;2-						1				1		
72-43-5	Pesticides	methoxychlor		4.50E-02	1.55E+03	6.48E-04	1.18E-04	1		8.00E+04	8.00E+01	1	4.00E+01	MCL
110-49-6	VOCs	methoxyethanol acetate;2-						2				1		
109-86-4	VOCs	methoxyethanol;2-						2				1		
79-20-9	VOCs	methyl acetate					2.88E-03	2				1		
96-33-3	VOCs	methyl acrylate					4.30E-03	2				1		
78-93-3	VOCs	methyl ethyl ketone					1.31E-03	2				1		
108-10-1	VOCs	methyl isobutyl ketone					2.92E-03	2				1		
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES					1				1		
80-62-6	VOCs	methyl methacrylate					6.90E-03	2				1		
90-12-0	PAHs	methyl naphthalene;1-					1.59E-02	2				1		
91-57-6	PAHs	methyl naphthalene;2-					6.99E-03	2				1		
298-00-0	Pesticides	methyl parathion						1				1		
25013-15-4	VOCs	methyl styrene						2				1		
98-83-9	SVOCs	methyl styrene, alpha						2				1		
1634-04-4	VOCs	methyl tert-butyl ether		5.00E+04		1.80E-02	1.59E-02	2		1.09E+01	1.09E-02	1	2.40E+01	C
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-						1				1		
99-55-8	SVOCs	methyl-5-nitroaniline;2-						1				1		
636-21-5	SVOCs	methylaniline hydrochloride;2-						1				1		
95-53-4	VOCs	methylaniline;2-						2				1		
108-87-2	VOCs	methylcyclohexane					2.39E+00	2				1		
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-						1				1		
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-						1				1		
74-95-3	VOCs	methylene bromide					1.96E-02	2				1		
75-09-2	VOCs	methylene chloride		1.30E+04	9.00E-01	8.98E-02	5.67E-02	2		1.00E+01	1.00E-02	1	5.00E+00	MCL
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)						1				1		
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)						1				1		
101-77-9	SVOCs	methylenebisbenzenamine;4,4-						1				1		
60-34-4	VOCs	methylhydrazine						2				1		
51218-45-2	Pesticides	metolachlor						1				1		
21087-64-9	Pesticides	metribuzin						1				1		
7786-34-7	Pesticides	mevinphos						1				1		
2385-85-5	Pesticides	mirex						1				1		
2212-67-1	Pesticides	molinate						1				1		
7439-98-7	Metals	molybdenum				0.00E+00	0.00E+00	1				1		

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10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS					1				1		
unavailable03	SVOCs	monochlorobutanes (not in HSDB)						1				1		
300-76-5	Pesticides	naled						1				1		
91-20-3	PAHs	naphthalene		3.10E+01	1.05E+01	1.98E-02	8.24E-03	2		1.19E+03	1.19E+00	1	1.60E+02	N
15299-99-7	Pesticides	napropamide						1				1		
104-51-8	VOCs	n-butylbenzene					2.42E-01	2				1		
2429-74-5	Dyes	niagara blue 4B						1				1		
unavailable04	Metals	nickel refinery dust				0.00E+00	0.00E+00	1				1		
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT		4.70E+01	0.00E+00	0.00E+00	1	6.50E+01		6.50E+01	1	1.00E+02	MCL
12035-72-2	Metals	nickel subsulfide						1				1		
14797-55-8	Nutrients	nitrate						1				1		
10102-43-9	Gases	nitric oxide						2				1		
14797-65-0	Nutrients	nitrite						1				1		
88-74-4	SVOCs	nitroaniline, 2-						1				1		
100-01-6	SVOCs	nitroaniline, 4-						1				1		
98-95-3	Explosives	nitrobenzene		2.90E+03	2.89E+00	9.84E-04	3.96E-04	2		1.19E+02	1.19E-01	1	1.60E+01	N
67-20-9	SVOCs	nitrofurantoin						1				1		
59-87-0	SVOCs	nitrofurazone						1				1		
10102-44-0	Gases	nitrogen dioxide						2				1		
556-88-7	SVOCs	nitroguanidine						1				1		
79-46-9	VOCs	nitropropane;2-					2.60E-03	2				1		
1116-54-7	SVOCs	nitrosodiethanolamine;N-						1				1		
55-18-5	SVOCs	nitrosodiethylamine;N-						2				1		
62-75-9	SVOCs	nitrosodimethylamine;N-			2.60E-02			2				1		
924-16-3	VOCs	nitroso-di-n-butylamine;N-						2				1		
621-64-7	SVOCs	nitroso-di-n-propylamine;N-		9.89E+03	1.13E+00	9.23E-05	5.44E-05	1		2.40E+01	2.40E-02	1	1.30E-02	C
86-30-6	SVOCs	nitrosodiphenylamine;N-		3.51E+01	1.36E+02	2.05E-04	1.02E-04	1		1.29E+03	1.29E+00	1	1.80E+01	C
4549-40-0	SVOCs	nitrosomethylvinylamine,n-						1				1		
759-73-9	SVOCs	nitroso-n-ethylurea;n-						1				1		
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-						1				1		
684-93-5	SVOCs	nitroso-n-methylurea,n-						1				1		
930-55-2	SVOCs	nitrosopyrrolidine;N-						2				1		
99-08-1	Explosives	nitrotoluene, m-						2				1		
88-72-2	Explosives	nitrotoluene, o-					1.73E-04	2				1		
99-99-0	Explosives	nitrotoluene, p-						2				1		
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-						2				1		
84852-15-3	Phenols	nonylphenol						1				1		
27314-13-2	Pesticides	norflurazon						1				1		
85509-19-9	Herbicides	nustar						1				1		
32536-52-0	PBDEs	octabromodiphenyl ether			3.20E+00			1				1		
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine						1				1		
152-16-9	SVOCs	octamethylpyrophosphoramide						1				1		
19044-88-3	Pesticides	oryzalin						1				1		
19666-30-9	Pesticides	oxadiazon						1				1		
23135-22-0	Pesticides (Carbamate)	oxamyl						1				1		
42874-03-3	Pesticides	oxyfluorfen						1				1		
76738-62-0	Herbicides	paclobutrazol						1				1		
unavailable05	PAHs	PAHs	PAH NOTES					1				1		
4685-14-7	Pesticides	paraquat						1				1		
56-38-2	Pesticides	parathion						1				1		
1114-71-2	Pesticides	pebulate						2				1		
40487-42-1	Pesticides	pendimethalin						1				1		
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-						1				1		
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-			8.10E+03			1				1		

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32534-81-9	PBDEs	pentabromodiphenyl ethers						1				1		
608-93-5	SVOCs	pentachlorobenzene						1		3.21E+04	3.21E+01	1		
82-68-8	Pesticides	pentachloronitrobenzene						1				1		
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT	1.95E+03	1.10E+01	1.00E-06	2.10E-07	1		5.92E+02	5.92E-01	1	1.00E+00	MCL
14797-73-0	Perchlorates	perchlorate and perchlorate salts						1				1		
52645-53-1	Pesticides	permethrin						1				1		
72-56-0	Pesticides	perthane						1				1		
unavailable19	General Chemistry	pH	pH NOTES					1				1		
85-01-8	PAHs	phenanthrene						1				1		
13684-63-4	Pesticides	phenmedipham						1				1		
108-95-2	Phenols	phenol		8.28E+04	1.40E+00	1.63E-05	6.49E-06	2		2.88E+01	2.88E-02	1	2.40E+03	N
106-50-3	SVOCs	phenylenediamine, p-						1				1		
108-45-2	SVOCs	phenylenediamine;m-						1				1		
95-54-5	SVOCs	phenylenediamine;o-						1				1		
62-38-4	Metals (organometallic)	phenylmercuric acetate						1				1		
90-43-7	Phenols	phenylphenol;2-						1				1		
298-02-2	Pesticides	phorate						1				1		
75-44-5	VOCs	phosgene						2				1		
732-11-6	Pesticides	phosmet						1				1		
7803-51-2	Gases	phosphine						2				1		
7664-38-2	SVOCs	phosphoric acid						2				1		
7723-14-0	Metals	phosphorus						2				1		
100-21-0	Phthalates	phthalic acid;p-						1				1		
85-44-9	Phthalates	phthalic anhydride						1				1		
1918-02-1	Herbicides	picloram						1				1		
29232-93-7	Pesticides	pirimiphos-methyl						1				1		
59536-65-1	PBBs	polybrominated biphenyls						1				1		
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)		7.00E-01	3.12E+04			1		3.09E+05		1		
151-50-8	Cyanides	potassium cyanide						1				1		
7778-74-7	Perchlorates	potassium perchlorate						1				1		
506-61-6	Cyanides	potassium silver cyanide						1				1		
67747-09-5	Pesticides	prochloraz (not in HSDB)						1				1		
26399-36-0	Pesticides	profluralin						1				1		
1610-18-0	Pesticides	prometon						1				1		
7287-19-6	Pesticides	prometryn						1				1		
23950-58-5	Pesticides	pronamide						1				1		
1918-16-7	Pesticides	propachlor						1				1		
709-98-8	Pesticides	propanil						1				1		
2312-35-8	Pesticides	propargite						2				1		
107-19-7	VOCs	propargyl alcohol						2				1		
139-40-2	Pesticides	propazine						1				1		
122-42-9	Pesticides	propham						1				1		
60207-90-1	Pesticides	propiconazole						1				1		
123-38-6	VOCs	propionaldehyde						2				1		
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-						1				1		
103-65-1	VOCs	propylbenzene;n-					2.03E-01	2				1		
57-55-6	Glycols	propylene glycol						2				1		
6423-43-4	Glycols	propylene glycol dinitrate;1,2-						2				1		
52125-53-8	Glycols	propylene glycol monoethyl ether						2				1		
107-98-2	Glycols	propylene glycol monomethyl ether						2				1		
75-56-9	VOCs	propylene oxide						2				1		
81335-77-5	Pesticides	pursuit						1				1		
51630-58-1	Pesticides	pydrin						1				1		
129-00-0	PAHs	pyrene		1.35E-01	3.00E+01	4.51E-04	1.08E-04	1		6.80E+04	6.80E+01	1	4.80E+02	N

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110-86-1	VOCs	pyridine						2				1		
13593-03-8	Pesticides	quinalphos						1				1		
91-22-5	SVOCs	quinoline						2				1		
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE			0.00E+00	0.00E+00	1				1		
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES			0.00E+00	0.00E+00	1				1		
121-82-4	Explosives	rdx						1				1		
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE					1				1		
10453-86-8	Pesticides	resmethrin						1				1		
299-84-3	Pesticides	ronnel						1				1		
83-79-4	Pesticides	rotenone						1				1		
78-48-8	Pesticides	s,s,s-tributylphosphorotrithioate						1				1		
78587-05-0	Pesticides	savey						1				1		
135-98-8	VOCs	sec-butylbenzene					2.65E-01	2				1		
7783-00-8	Metals	selenious acid						1				1		
7782-49-2	Metals	selenium and compounds			4.80E+00	0.00E+00	0.00E+00	1	5.00E+00		5.00E+00	1	5.00E+01	MCL
630-10-4	Metals (organometallic)	selenourea						1				1		
74051-80-2	Pesticides	sethoxydim						1				1		
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT		5.00E-01	0.00E+00	0.00E+00	1	8.30E+00		8.30E+00	1	8.00E+01	N
506-64-9	Cyanides	silver cyanide						1				1		
122-34-9	Pesticides	simazine						1				1		
26628-22-8	Metals	sodium azide						2				1		
143-33-9	Cyanides	sodium cyanide						1				1		
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate						1				1		
62-74-8	Metals (organometallic)	sodium fluoroacetate						1				1		
13718-26-8	Metals	sodium metavanadate						1				1		
7601-89-0	Perchlorates	sodium perchlorate						1				1		
7440-24-6	Metals	strontium				0.00E+00	0.00E+00	1				1		
57-24-9	SVOCs	strychnine						1				1		
100-42-5	VOCs	styrene		3.10E+02		1.13E-01	5.59E-02	2		9.12E+02	9.12E-01	1	1.00E+02	MCL
unavailable17	Metals	sulfate						1				1		
88671-89-0	Pesticides	systhane						1				1		
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES		5.00E+03			1				0.6		
34014-18-1	Pesticides	tebuthiuron						1				1		
3383-96-8	Pesticides	temephos						1				1		
5902-51-2	Pesticides	terbacil						1				1		
13071-79-9	SVOCs	terbufos						1				1		
886-50-0	Pesticides	terbutryn						1				1		
98-06-6	VOCs	tert-butylbenzene					2.58E-01	2				1		
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'						1				1		
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-						1				1		
630-20-6	VOCs	tetrachloroethane;1,1,1,2-					4.59E-02	2				1		
79-34-5	VOCs	tetrachloroethane;1,1,2,2-		2.97E+03	5.00E+00	1.41E-02	6.96E-03	2		7.90E+01	7.90E-02	1	2.20E-01	C
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES	2.00E+02	3.10E+01	7.54E-01	3.98E-01	2		2.65E+02	2.65E-01	1	5.00E+00	MCL
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT					1		2.80E+02	2.80E-01	1		
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-						1				1		
961-11-5	Pesticides	tetrachlorvinphos						1				1		
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate						1				1		
78-00-2	Metals (organometallic)	tetraethyl lead						2				1		
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-						2				1		
109-99-9	Furans	tetrahydrofuran						2				1		
1314-32-5	Metals	thallic oxide						1				1		
563-68-8	Metals	thallium acetate						1				1		
6533-73-9	Metals	thallium carbonate						1				1		
7791-12-0	Metals	thallium chloride						1				1		

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	S (Aqueous Solubility) (mg/L)	BCF (Bioconcentration Factor) (L/kg)	Hcc (Henry's Law Constant) 25 degrees C (unitless)	Hcc (Henry's Law Constant @ 13 degrees C) (unitless)	INH (Inhalation Correction Factor) (unitless)	Kd (Distribution Factor for metals) (L/kg)	Koc (Soil Organic Carbon-Water Partitioning Coefficient) (L/kg)	Kd (Distribution Factor for metals and non-ionizing organics) (L/kg)	GI Absorption Fraction (unitless)	Ground Water Target Cleanup Level for Soil to Groundwater Pathway see guidance (µg/L)	Ground Water Target Criterion see guidance
10102-45-1	Metals	thallium nitrate						1				1		
12039-52-0	Metals	thallium selenite						1				1		
7446-18-6	Metals	thallium(I) sulfate						1				1		
7440-28-0	Metals	thallium, soluble salts			1.16E+02	0.00E+00	0.00E+00	1	7.10E+01		7.10E+01	1	1.60E-01	N
28249-77-6	Pesticides	thiobencarb						1				1		
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-						1				1		
39196-18-4	Pesticides	thiofanox						1				1		
23564-05-8	Pesticides	thiophanate-methyl						1				1		
137-26-8	Pesticides	thiram						2				1		
7440-31-5	Metals	tin				0.00E+00	0.00E+00	1				1		
118-96-7	Explosives	tnt						1				1		
108-88-3	VOCs	toluene		5.26E+02	1.07E+01	2.72E-01	1.48E-01	2		1.40E+02	1.40E-01	1	6.40E+02	N
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-						2				1		
584-84-9	VOCs	toluene-2,4-diisocyanate						2				1		
91-08-7	VOCs	toluene-2,6-diisocyanate						2				1		
95-80-7	SVOCs	toluenediamine;2,4-						1				1		
95-70-5	SVOCs	toluenediamine;2,5-						1				1		
823-40-5	SVOCs	toluenediamine;2,6-						1				1		
106-49-0	SVOCs	toluidine;p-						2				1		
unavailable18	General Chemistry	total dissolved solids						1				1		
8001-35-2	Pesticides	toxaphene		7.40E-01	1.31E+04	2.46E-04	5.16E-05	1		9.58E+04	9.58E+01	1	8.00E-01	MCL C ADJ
93-72-1	Herbicides	tp;2,4,5-						1				1		
unavailable09	Petroleum	tph, diesel range organics						1				1		
unavailable10	Petroleum	tph, heavy oils						1				1		
unavailable11	Petroleum	tph, mineral oils						1				1		
unavailable25	Petroleum	tph: gasoline range organics, benzene present						1				1		
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene						1				1		
66841-25-6	Pesticides	tralomethrin						1				1		
2303-17-5	Pesticides	triallate						1				1		
82097-50-5	Pesticides	triasulfuron						1				1		
615-54-3	VOCs	tribromobenzene;1,2,4-						1				1		
688-73-3	Organotins	tributyltin						1				1		
56-35-9	Organotins	tributyltin oxide						1				1		
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS					1				1		
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-					1.25E+01	2				1		
76-03-9	SVOCs	trichloroacetic acid						1				1		
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-						1				1		
634-93-5	SVOCs	trichloroaniline;2,4,6-						1				1		
120-82-1	VOCs	trichlorobenzene;1,2,4-		3.00E+02	1.14E+02	5.82E-02	2.37E-02	2		1.66E+03	1.66E+00	1	1.50E+01	MCL C ADJ
71-55-6	VOCs	trichloroethane;1,1,1-		1.33E+03	5.60E+00	7.05E-01	4.19E-01	2		1.35E+02	1.35E-01	1	2.00E+02	MCL
79-00-5	VOCs	trichloroethane;1,1,2-		4.42E+03	4.50E+00	3.74E-02	1.97E-02	2		7.50E+01	7.50E-02	1	5.00E+00	MCL
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES	1.10E+03	1.10E+01	4.22E-01	2.39E-01	2		9.40E+01	9.40E-02	1	4.00E+00	N
75-69-4	VOCs	trichlorofluoromethane					2.67E+00	2				1		
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT	1.20E+03		1.78E-04	6.53E-05	2		1.60E+03	1.60E+00	1	8.00E+02	N
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT	8.00E+02	1.50E+02	3.19E-04	1.07E-04	2		3.81E+02	3.81E-01	1	4.00E+00	C
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-						1				1		
598-77-6	VOCs	trichloropropane;1,1,2-						2				1		
96-18-4	VOCs	trichloropropane;1,2,3-					7.94E-03	2				1		
96-19-5	VOCs	trichloropropene;1,2,3-						2				1		
58138-08-2	Pesticides	tridiphane						1				1		
121-44-8	VOCs	triethylamine						2				1		
1582-09-8	Pesticides	trifluralin						1				1		
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES					2				1		
512-56-1	SVOCs	trimethyl phosphate						2				1		
526-73-8	VOCs	trimethylbenzene;1,2,3-						2				1		
95-63-6	VOCs	trimethylbenzene;1,2,4-					1.15E-01	2				1		
108-67-8	VOCs	trimethylbenzene;1,3,5-					1.10E-01	2				1		

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	S (Aqueous Solubility) (mg/L)	BCF (Bioconcentration Factor) (L/kg)	Hcc (Henry's Law Constant) 25 degrees C (unitless)	Hcc (Henry's Law Constant @ 13 degrees C) (unitless)	INH (Inhalation Correction Factor) (unitless)	Kd (Distribution Factor for metals) (L/kg)	Koc (Soil Organic Carbon-Water Partitioning Coefficient) (L/kg)	Kd (Distribution Factor for metals and non-ionizing organics) (L/kg)	GI Absorption Fraction (unitless)	Ground Water Target Cleanup Level for Soil to Groundwater Pathway see guidance (µg/L)	Ground Water Target Criterion see guidance
99-35-4	Explosives	trinitrobenzene;1,3,5-						1				1		
479-45-8	Explosives	trinitrophenylmethylnitramine						2				1		
unavailable12	Radionuclides	uranium, soluble salts				0.00E+00	0.00E+00	1				1		
7440-62-2	Metals	vanadium				0.00E+00	0.00E+00	1	1.00E+03		1.00E+03	1	8.00E+01	N
1314-62-1	Metals	vanadium pentoxide						1				1		
27774-13-6	Metals	vanadyl sulfate						1				1		
1929-77-7	Pesticides	vernam						2				1		
50471-44-8	Pesticides	vinclozolin						1				1		
108-05-4	VOCs	vinyl acetate		2.00E+04		2.10E-02	1.17E-02	2		5.25E+00	5.25E-03	1	8.00E+03	N
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES	2.76E+03	1.17E+00	1.11E+00	8.07E-01	2		1.86E+01	1.86E-02	1	2.90E-01	MCL C ADJ
81-81-2	Pesticides	warfarin						2				1		
8012-95-1	Petroleum	white mineral oil						1				1		
108-38-3	VOCs	xylene;m-		1.61E+02		3.01E-01	1.51E-01	2		1.96E+02	1.96E-01	1	1.60E+03	N
95-47-6	VOCs	xylene;o-		1.78E+02		2.13E-01	1.06E-01	2		2.41E+02	2.41E-01	1	1.60E+03	N
106-42-3	VOCs	xylene;p-		1.85E+02		3.14E-01	1.58E-01	2		3.11E+02	3.11E-01	1	1.60E+03	N
1330-20-7	VOCs	xylenes		1.71E+02		2.79E-01	1.38E-01	2		2.33E+02	2.33E-01	1	1.60E+03	N
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT		4.70E+01	0.00E+00	0.00E+00	1	6.20E+01		6.20E+01	1	4.80E+03	N
557-21-1	Cyanides	zinc cyanide						1				1		
1314-84-7	Metals	zinc phosphide						1				1		
12122-67-7	Pesticides	zineb						1				1		

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Chemical Synonyms Compiled from Ecology's Environmental Information Management System (EIM) Database
83-32-9	PAHs	acenaphthene		
208-96-8	PAHs	acenaphthylene		
30560-19-1	Pesticides	acephate		Acephate, Orthene, Phosphoramidothioic acid, acetyl-, O,S-d
75-07-0	VOCs	acetaldehyde		Acetaldehyde, Ethanal
34256-82-1	Pesticides	acetochlor		
67-64-1	VOCs	acetone		Acetone, 2-Propanone, Methyl ketone
75-86-5	VOCs	acetone cyanohydrin		Acetone cyanohydrin, 2-Methyllactonitrile, Propanenitrile, 2-hydroxy-2-methyl-
75-05-8	VOCs	acetonitrile		
98-86-2	SVOCs	acetophenone		Ethanone, 1-Phenyl-, Acetophenone
62476-59-9	Herbicides	acifluorfen, sodium		Acifluorfen, sodium salt, Blazer
107-02-8	VOCs	acrolein		Acrolein, 2-Propenal
79-06-1	VOCs	acrylamide		Acrylamide, 2-Propenamide
79-10-7	VOCs	acrylic acid		Acrylic Acid, 2-Propenoic acid, Vinyl formic acid
107-13-1	VOCs	acrylonitrile		Acrylonitrile, 2-Propenenitrile
15972-60-8	Pesticides	alachlor		
1596-84-5	Pesticides	alar		Daminozide, Alar
116-06-3	Pesticides (Carbamate)	aldicarb		
1646-88-4	Pesticides (Carbamate)	aldicarb sulfone		
309-00-2	Pesticides	aldrin		
74223-64-6	Pesticides	ally		Metsulfuron-methyl, Ally
107-18-6	VOCs	allyl alcohol		Allyl alcohol, 2-Propen-1-ol
107-05-1	VOCs	allyl chloride		Allyl Chloride, 1-Propene, 3-chloro-, 3-Chloropropene
7429-90-5	Metals	aluminum		
20859-73-8	Metals	aluminum phosphide		
67485-29-4	Pesticides	amdro		Hydramethylnon, Amdro
834-12-8	Pesticides	ametryn		
591-27-5	Phenols	aminophenol;m-		3-Aminophenol, Aminophenol, m-
504-24-5	SVOCs	aminopyridine;4-		4-Aminopyridine, Avitrol
33089-61-1	Pesticides	amitraz		Amitraz, BAAM
7664-41-7	Nutrients	AMMONIA	AMMONIA NOTES	
7790-98-9	Perchlorates	ammonium perchlorate		Ammonium perchlorate, Perchloric acid, ammonium salt
7773-06-0	Pesticides	ammonium sulfamate		Ammonium sulfamate, Sulfamic acid, monoammonium salt
62-53-3	SVOCs	aniline		Aniline, Benzenamine
120-12-7	PAHs	anthracene		
7440-36-0	Metals	antimony		
1314-60-9	Metals	antimony pentoxide		Antimony oxide (Sb2O5), Antimony Pentoxide
28300-74-5	Metals	antimony potassium tartrate		Antimony potassium tartrate, Antimonate(2-), bis[.mu.-[2,3-di(hydroxy-. kappa.O)butanedioato(4-)-. kappa.O1:.kappa.O4]]di-, dipotassium, trihydrate, stereoisomer
1332-81-6	Metals	antimony tetroxide		Antimony oxide (Sb2O4), Antimony tetroxide
1309-64-4	Metals	antimony trioxide		Antimony trioxide, Antimony oxide (Sb2O3)
74115-24-5	Pesticides	apollo		Clofentezine, Apollo
140-57-8	SVOCs	aramite		
12674-11-2	PCBs	aroclor 1016		PCB-aroclor 1016, Aroclor 1016, PCB-1016, PCB-aroclor-1016
11097-69-1	PCBs	aroclor 1254		PCB-aroclor 1254, Aroclor 1254, PCB-1254, PCB-aroclor-1254
11096-82-5	PCBs	aroclor 1260		PCB-aroclor 1260, Aroclor 1260, PCB-1260, PCB-aroclor-1260
7440-38-2	Metals	arsenic, inorganic		
7784-42-1	Metals	arsine		
1332-21-4	Fibers	ASBESTOS	ASBESTOS NOTE	Asbestos, Asbestos, (fibrous)
76578-14-8	Pesticides	assure		Quizalofop-ethyl, Assure
3337-71-1	Pesticides	asulam		Asulam, Carbamic acid, [(4-aminophenyl)sulfonyl]-, methyl ester
1912-24-9	Pesticides	atrazine		
65195-55-3	Pesticides	avermectin B1		Avermectin B1a, Avermectin A1a, 5-O-demethyl-
103-33-3	Pesticides	azobenzene		Azobenzene, Diazene, diphenyl-
7440-39-3	Metals	barium and compounds		
542-62-1	Metals	barium cyanide		

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114-26-1	Pesticides	baygon		Propoxur, Baygon, Phenol, 2-(1-methylethoxy)-,methylcarbamate
43121-43-3	Pesticides	bayleton		Triademefon
68359-37-5	Pesticides	baythroid		Cyfluthrin, Baythroid
1861-40-1	Pesticides	benefin		Benfluralin, Benefin, Benetin, Benzenamine, N-butyl-N-ethyl-2,6-dinitro-4-(trifluoromethyl)-
17804-35-2	Pesticides	benomyl		
25057-89-0	Herbicides	bentazon		Bentazon, 1H-2,1,3-Benzothiadiazin-4(3H)-one, 3-(1-methylethyl)-, 2,2-dioxide, Bentazone
100-52-7	SVOCs	benzaldehyde		
71-43-2	VOCs	BENZENE		
108-98-5	SVOCs	benzenethiol		Thiophenol, Benzenethiol
92-87-5	SVOCs	benzidine		
191-24-2	PAHs	benzo(g,h,i)perylene		Benzo(ghi)perylene, Benzo(g,h,i)perylene, Benzo[g,h,i]perylene
56-55-3	cPAHs	BENZO[a]ANTHRACENE	PAH NOTES	Benz[a]anthracene, 1,2-Benzanthracene, Benzo(a)anthracene, Benzo[a]anthracene
50-32-8	cPAHs	BENZO[a]PYRENE	PAH NOTES	Benzo(a)pyrene, Benzo[a]pyrene
205-99-2	cPAHs	BENZO[b]FLUORANTHENE	PAH NOTES	Benzo(b)fluoranthene, Benz(e)acephenanthrylene, Benzo[b]fluoranthene
207-08-9	cPAHs	BENZO[k]FLUORANTHENE	PAH NOTES	Benzo(k)fluoranthene, Benzo[k]fluoranthene
65-85-0	SVOCs	BENZOIC ACID	pH-DEPENDENT	
98-07-7	VOCs	benzotrichloride		Benzotrichloride, Benzene, (trichloromethyl)-
100-51-6	SVOCs	benzyl alcohol		
100-44-7	VOCs	benzyl chloride		Benzyl chloride, Toluene, .alpha.-chloro-, Toluene, alpha-chloro-
7440-41-7	Metals	beryllium		
91-58-7	PAHs	beta-chloronaphthalene		PCN-002, 2-Chloronaphthalene
141-66-2	SVOCs	bidrin		Dicrotophos, Bidrin, Phosphoric acid, 3-(dimethylamino)-1-me*
82657-04-3	Pesticides	biphenthrin		Bifenthrin, Biphenthrin
92-52-4	PAHs	biphenyl;1,1-		1,1'-Biphenyl, Biphenyl, Diphenyl
108-60-1	VOCs	bis(2-chloro-1-methyl-ethyl)ether		Bis(2-chloro-1-methylethyl) ether, Propane, 2,2'-oxybis[1-chloro-
111-44-4	SVOCs	bis(2-chloroethyl)ether		
39638-32-9	VOCs	bis(2-chloroisopropyl) ether		Bis(2-chloroisopropyl) ether, Bis(2-chloroisopropyl)ether, Propane, 2,2'-oxybis[2-chloro-
117-81-7	Phthalates	bis(2-ethylhexyl) phthalate		Di(2-ethylhexyl) phthalate, 1,2-Benzenedicarboxylic acid, 1,2-bis(2-ethylhexyl) ester, BEHP, Bis (2-ethylhexyl) phthalate, Bis(2-ethylhexyl) phthalate, Bis(2-ethylhexyl)phthalate, DEHP
542-88-1	VOCs	bis(chloromethyl)ether		
80-05-7	Phenols	bisphenol a		Bisphenol A, 4,4'-Isopropylidenediphenol, Phenol, 4,4'-(1-methylethylidene)bis-
7440-42-8	Metals	boron		
15541-45-4	Pesticides	bromate		
79-08-3	SVOCs	bromoacetic acid		
108-86-1	VOCs	bromobenzene		
75-27-4	VOCs	bromodichloromethane	TTHM NOTES	Dichlorobromomethane, Bromodichloromethane, Methane, bromodichloro-
593-60-2	VOCs	bromoethene		Vinyl bromide, Ethene, bromo-
75-25-2	VOCs	bromoform	TTHM NOTES	Bromoform, Methane, tribromo-, Tribromomethane
74-83-9	VOCs	bromomethane		Bromomethane, Methyl bromide
2104-96-3	Pesticides	bromophos		
1689-84-5	Herbicides	bromoxynil		Brominal
1689-99-2	Pesticides	bromoxynil octanoate		Bromoxynil octanoate, Octanoic acid, 2,6-dibromo-4-cyanophenyl ester
106-99-0	VOCs	butadiene;1,3-		
71-36-3	VOCs	butanol;n-		1-Butanol, n-Butanol, n-Butyl alcohol
85-68-7	Phthalates	butyl benzyl phthalate		Butyl benzyl phthalate, 1,2-Benzenedicarboxylic acid, 1-butyl 2-(phenylmethyl) ester, Butylbenzyl phthalate, Phthalic acid, benzyl butyl ester
2008-41-5	Pesticides	butylate		
85-70-1	Phthalates	butylphthalyl butylglycolate		2-Butoxy-2-oxoethyl butyl phthalate, Butylphthalyl butylglycolate
94-81-5	SVOCs	butyric acid;4-(2-methyl-4-chlorophenoxy)-		MCPB
75-60-5	Pesticides	cacodylic acid		Cacodylic acid, Arsinic acid, dimethyl-, Dimethylarsenic acid, Dimethylarsinic acid, DMAA, Hydroxydimethylarsine oxide, Silvisar 510
7440-43-9	Metals	CADMIUM (POTABLE GROUNDWATER & SURFACE WATER)	CADMIUM NOTES	
7440-43-9a	Metals	CADMIUM (SOIL & NONPOTABLE SURFACE WATER)	CADMIUM NOTES	
592-01-8	Cyanides	calcium cyanide		
105-60-2	SVOCs	caprolactam		
2425-06-1	Pesticides	captafol		Captafol, 1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(1,1,2,2-tetrachloroethyl)thio]-, Difolatan
133-06-2	Pesticides	captan		

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63-25-2	Pesticides (Carbamate)	carbaryl		Carbaryl, 1-Naphthalenol, methylcarbamate, Sevin
86-74-8	PAHs	carbazole		
1563-66-2	Pesticides (Carbamate)	carbofuran		Furaden
75-15-0	VOCs	carbon disulfide		
56-23-5	VOCs	carbon tetrachloride		
786-19-6	Pesticides	carbophenothion		
55285-14-8	Pesticides	carbosulfan		
5234-68-4	Pesticides	carboxin		
1306-38-3	Metals	cerium oxide and cerium compounds		Cerium oxide (CeO2), Cerium Oxide and Cerium Compounds
75-87-6	VOCs	chloral		Chloral, Acetaldehyde, 2,2,2-trichloro-
302-17-0	VOCs	chloral hydrate		Chloral Hydrate, 1,1-Ethanediol, 2,2,2-trichloro-
133-90-4	Herbicides	chloramben		
118-75-2	Pesticides	chloranil		Chloranil, 2,5-Cyclohexadiene-1,4-dione, 2,3,5,6-tetrachloro-
12789-03-6	Pesticides	chlordane		Chlordane, technical, Chlordane, Chlordane technical mixture
143-50-0	SVOCs	chlordecone (kepone)		
16887-00-6	Nutrients	chloride		
90982-32-4	Pesticides	chlorimuron-ethyl		
7782-50-5	Nutrients	chlorine	MCL FOR DISINFECTANTS	
506-77-4	Cyanides	chlorine cyanide		
10049-04-4	VOCs	chlorine dioxide	MCL FOR DISINFECTANTS	Chlorine dioxide, Chlorine oxide (ClO2)
7758-19-2	Nutrients	chlorite		Sodium chlorite, Chlorous acid, sodium salt, Textone
75-68-3	VOCs	chloro-1,1-difluoroethane;1-		HCFC-142b, Ethane, 1-Chloro-1,1-Difluoro-, Freon 142
126-99-8	VOCs	chloro-1,3-butadiene;2-		Chloroprene, 1,3-Butadiene, 2-chloro-
3165-93-3	SVOCs	chloro-2-methylaniline hydrochloride;4-		4-Chloro-o-toluidine hydrochloride, Benzenamine, 4-chloro-2-methyl-, hydrochloride, chloro-2-methylaniline hydrochloride;4-
95-69-2	SVOCs	chloro-2-methylaniline;4-		4-Chloro-2-methylaniline, Benzenamine, 4-chloro-2-methyl-
79-11-8	SVOCs	chloroacetic acid		
532-27-4	SVOCs	chloroacetophenone;2-		Ethanone, 2-chloro-1-phenyl-, 2-Chloroacetophenone
106-47-8	SVOCs	chloroaniline;p-		4-Chloroaniline, Benzenamine, 4-chloro-, p-Chloroaniline, para-Chloroaniline
108-90-7	VOCs	chlorobenzene		
510-15-6	Pesticides	chlorobenzilate		
74-11-3	Pesticides	chlorobenzoic acid;p-		p-Chlorobenzoic acid, Benzoic acid, 4-chloro-
98-56-6	VOCs	chlorobenzotrifluoride;4-		p-Chlorobenzotrifluoride, Benzene, 1-chloro-4-(trifluoromethyl)-
109-69-3	VOCs	chlorobutane;1-		
59-50-7	Phenols	chlorocresol		4-Chloro-3-Methylphenol, p-Chloro-m-cresol
75-45-6	VOCs	chlorodifluoromethane		Methane, Chlorodifluoro-, Freon 22, HCFC-22
67-66-3	VOCs	chloroform	TTHM NOTES	Chloroform, Methane, trichloro-, Methyl trichloride
74-87-3	VOCs	chloromethane		
107-30-2	VOCs	chloromethyl methyl ether		Chloromethyl methyl ether, Methane, chloromethoxy-
88-73-3	Pesticides	chloronitrobenzene;o-		o-Chloronitrobenzene, Benzene, 1-chloro-2-nitro-
100-00-5	Pesticides	chloronitrobenzene;p-		p-Chloronitrobenzene, Benzene, 1-chloro-4-nitro-
95-57-8	Phenols	CHLOROPHENOL;2-	pH-DEPENDENT	
123-09-1	Pesticides	chlorophenyl methyl sulfide;p-		p-Chlorophenyl methyl sulfide, Benzene, 1-chloro-4-(methylthio)-
98-57-7	SVOCs	chlorophenyl methyl sulfone;p-		p-Chlorophenyl methyl sulfone, Benzene, 1-Chloro-4-(Methylsulfonyl)-
934-73-6	SVOCs	chlorophenyl methyl sulfoxide;p-		p-Chlorophenyl methyl sulfoxide, Benzene, 1-chloro-4-(methylsulfinyl)-
75-29-6	VOCs	chloropropane;2-		
1897-45-6	Pesticides	chlorothalonil		Daconil
95-49-8	VOCs	chlorotoluene;o-		2-Chlorotoluene, o-Chlorotoluene
101-21-3	Pesticides	chlorpropham		
2921-88-2	Pesticides	chlorpyrifos		Chlorpyrifos, Chlorpyriphos, Dursban, Phosphorothioic acid, O,O-diethyl O-(3,*
5598-13-0	Pesticides	chlorpyrifos-methyl		Chlorpyrifos-methyl, Methyl Chlorpyrifos, Phosphorothioic acid, O,O-dimethyl O-(3,5,6-trichloro-2-pyridinyl) ester
64902-72-3	Herbicides	chlorsulfuron		
60238-56-4	Pesticides	chlorthiophos		Chlorthiophos, Chlorthiophos (mixture of isomers), Phosphorothioic acid, O-[dichloro(methylthio)phenyl] O,O-diethyl ester
7440-47-3	Metals	CHROMIUM (TOTAL)	CHROMIUM NOTES	Chromium, Chromium, Total
16065-83-1	Metals	CHROMIUM (III)	CHROMIUM NOTES	Chromium, Trivalent, Chromium III, Chromium, ion (Cr3+)

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Chemical Synonyms Compiled from Ecology's Environmental Information Management System (EIM) Database
18540-29-9	Metals	CHROMIUM (VI)	CHROMIUM NOTES	Chromium, Hexavalent, Chromium (VI), Chromium VI, Chromium, ion (Cr 6+)
218-01-9	cPAHs	CHRYSENE	PAH NOTES	
8001-58-9	PAHs	coal tar creosote		Creosote, Coal tar creosote
8007-45-2	VOCs	coke oven emissions		
7440-50-8	Metals	COPPER	HARDNESS - DEPENDENT	
544-92-3	Cyanides	copper cyanide		Copper cyanide, Copper(I) cyanide
108-39-4	Phenols	cresol;m-		m-Cresol, 1-Hydroxy-3-methylbenzene, 3-Methylphenol, meta-Cresol, Phenol, 3-methyl-
95-48-7	Phenols	cresol;o-		o-Cresol, 2-Methylphenol, o-Hydroxytoluene, ortho-Cresol, Phenol, 2-methyl-
106-44-5	Phenols	cresol;p-		p-Cresol, 4-Hydroxytoluene, 4-Methylphenol, para-Cresol, Phenol, 4-methyl-
4170-30-3	VOCs	crotonaldehyde		Crotonaldehyde, 2-Butenal
98-82-8	VOCs	cumene		Cumene, Benzene, (1-methylethyl)-, Isopropylbenzene, Isopropylbenzene (Cumene)
21725-46-2	Pesticides	cyanazine		
57-12-5	Cyanides	CYANIDE	CYANIDE NOTES	Cyanide, Cyanide, Total
460-19-5	Cyanides	cyanogen		Cyanogen, Ethanedinitrile
506-68-3	Cyanides	cyanogen bromide		
110-82-7	VOCs	cyclohexane		
108-94-1	VOCs	cyclohexanone		
108-91-8	SVOCs	cyclohexylamine		
542-92-7	SVOCs	cyclopentadiene		Cyclopentadiene, 1,3-Cyclopentadiene
68085-85-8	Pesticides	cyhalothrin/karate		
52315-07-8	Pesticides	cypermethrin		
66215-27-8	Pesticides	cyromazine		Cyromazine, 1,3,5-Triazine-2,4,6-triamine, N-cyclopropyl-
1861-32-1	Herbicides	dacthal		Chlorthal-dimethyl, 1,4-Benzenedicarboxylic acid,2,3,5,6-tetrachloro-,dimethyl ester, Dacthal, DCPA, Dimethyl tetrachloroterephthalate
75-99-0	Herbicides	dalapon, sodium salt		Dalapon, Dalapon (DPA), Propanoic acid, 2,2-dichloro-
39515-41-8	Pesticides	danitol		Fenpropathrin, Danitol
94-82-6	Herbicides	db;2,4-		2,4-DB, Butanoic acid, 4-(2,4-dichlorophenoxy)-, Butoxone, 2,4-DB acid
72-54-8	Pesticides	ddd		4,4'-DDD, p,p'-DDD
72-55-9	Pesticides	dde		4,4'-DDE, p,p'-DDE
50-29-3	Pesticides	ddt		4,4'-DDT, Benzene, 1,1'-(2,2,2-trichloroethyliden*, p,p'-DDT
1163-19-5	PBDEs	decabromodiphenyl ether		PBDE-209, 2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether, BDE-209, Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo-, DBDPE, Decabromobiphenyl ether, Decabromodiphenyl ether (BDE-209), Decabromodiphenyl oxide
8065-48-3	Pesticides	demeton		
103-23-1	Phthalates	di(2-ethylhexyl)adipate		Di(2-ethylhexyl) adipate, Hexanedioic Acid, Bis(2-Ethylhexyl) Ester
2303-16-4	Pesticides	diallate		Diallate (cis or trans)
333-41-5	Pesticides	diazinon		
53-70-3	cPAHs	DIBENZ[a,h]ANTHRACENE	PAH NOTES	Dibenzo(a,h)anthracene, Dibenz[a,h]anthracene
132-64-9	PAHs	dibenzofuran		
96-12-8	Pesticides	dibromo-3-chloropropane;1,2-		1,2-Dibromo-3-Chloropropane, DBCP, Propane, 1,2-dibromo-3-chloro-
631-64-1	SVOCs	dibromoacetic acid		
106-37-6	Pesticides	dibromobenzene;1,4-		p-Dibromobenzene, 1,4-DiBB, 1,4-Dibromobenzene, Benzene, 1,4-dibromo-
124-48-1	VOCs	dibromochloromethane	TTHM NOTES	Chlorodibromomethane, Dibromochloromethane, Methane, dibromochloro-
84-74-2	Phthalates	di-butyl phthalate		Dibutyl phthalate, 1,2-Benzenedicarboxylic acid, 1,2-dibutyl ester, Di-n-butyl phthalate, Di-n-butylphthalate
1918-00-9	Herbicides	dicamba		Dicamba, Banvel, Benzoic acid, 3,6-dichloro-2-methoxy-
3400-09-7	Disinfectants	dichloramine	MCL FOR DISINFECTANTS	
764-41-0	VOCs	dichloro-2-butene;1,4-		
79-43-6	SVOCs	dichloroacetic acid		
95-50-1	VOCs	dichlorobenzene;1,2-		1,2-Dichlorobenzene, o-Dichlorobenzene
541-73-1	VOCs	dichlorobenzene;1,3-		1,3-Dichlorobenzene, m-Dichlorobenzene
106-46-7	VOCs	dichlorobenzene;1,4-		1,4-Dichlorobenzene, p-Dichlorobenzene
91-94-1	SVOCs	dichlorobenzidine;3,3'-		
75-71-8	VOCs	dichlorodifluoromethane		CFC-12, Dichlorodifluoromethane, Freon 12, Methane, dichlorodifluoro-
75-34-3	VOCs	dichloroethane;1,1-		
107-06-2	VOCs	dichloroethane;1,2-		1,2-Dichloroethane, 1,2-DCA, Dichloroethane, EDC, Ethane, 1,2-dichloro-
540-59-0	VOCs	dichloroethylene,1,2- (mixed isomers)		1,2-Dichloroethene, 1,2-Dichloroethene, cis-, trans-, 1,2-Dichloroethylene, 1,2-Dichloroethylene, (mixed isomers)
75-35-4	VOCs	dichloroethylene;1,1-		1,1-Dichloroethene, 1,1-Dichloroethylene, Vinylidene chloride
156-59-2	VOCs	dichloroethylene;1,2-,cis		Cis-1,2-Dichloroethene, cis-1,2-Dichloroethylene, Ethene, 1,2-dichloro-, (1Z)-
156-60-5	VOCs	dichloroethylene;1,2-,trans		Trans-1,2-Dichloroethene, Ethene, 1,2-dichloro-, (1E)-, trans-1,2-Dichloroethylene
120-83-2	Phenols	DICHLOROPHENOL;2,4-	pH-DEPENDENT	

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94-75-7	Herbicides	dichlorophenoxyacetic acid;2,4-		2,4-D, 2,4-D Acid, Acetic acid, (2,4-dichlorophenoxy)-
78-87-5	VOCs	dichloropropane;1,2-		
616-23-9	SVOCs	dichloropropanol;2,3-		2,3-Dichloropropanol, 1-Propanol, 2,3-dichloro-
542-75-6	VOCs	dichloropropene;1,3-		1,3-Dichloropropene, 1-Propene, 1,3-dichloro-
62-73-7	Pesticides	dichlorvos		DDVP, Dichlorvos
115-32-2	Pesticides	dicofol		Dicofol, Benzenemethanol, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-(trichloromethyl)-, Kelthane
77-73-6	VOCs	dicyclopentadiene		Dicyclopentadiene, 4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-
60-57-1	Pesticides	dieldrin		Dieldrin, 2,7:3,6-Dimethanonaphth(2,3-b)oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a.alpha.,2.beta.,2a.alpha.,3.beta.,6.beta.,6a.alpha.,7.beta.,7a.alpha.)-
84-66-2	Phthalates	diethyl phthalate		Diethyl phthalate, 1,2-Benzenedicarboxylic acid, 1,2-diethyl ester, Diethylphthalate
111-46-6	Glycols	diethylene glycol		
693-21-0	Glycols	diethylene glycol dinitrate		Diethylene glycol dinitrate, Ethanol, 2,2'-oxybis-, dinitrate
112-34-5	Glycols	diethylene glycol monobutyl ether		
111-90-0	Glycols	diethylene glycol monoethyl ether		
617-84-5	SVOCs	diethylformamide		Diethylformamide, Formamide, N,N-diethyl-
311-45-5	Pesticides	diethyl-p-nitrophenylphosphate		Paraoxon, Parathion breakdown product, Phosphoric acid, diethyl 4-nitrophenyl, Methyl paraoxon
56-53-1	SVOCs	diethylstilbesterol		Diethylstilbestrol, DES
43222-48-6	Pesticides	difenzoquat		Difenzoquat methyl sulfate, 1H-Pyrazolium, 1,2-dimethyl-3,5-diphenyl-, methyl sulfate, Difenzoquat
35367-38-5	Pesticides	diflubenzuron		Diflubenzuron, Benzamide, N-[[(4-chlorophenyl)amino]carbonyl]-2,6-difluoro-
75-37-6	VOCs	difluoroethane;1,1-		HFC-152a, Ethane, 1,1-difluoro-
1445-75-6	SVOCs	diisopropyl methylphosphonate		Diisopropyl methylphosphonate, Phosphonic acid, methyl-, bis(1-methylethyl) ester
55290-64-7	Pesticides	dimethipin		Dimethipin, 1,4-Dithiin, 2,3-dihydro-5,6-dimethyl-, 1,1,4,4-tetraoxide
60-51-5	Pesticides	dimethoate		
119-90-4	SVOCs	dimethoxybenzidine;3,3'-		
131-11-3	Phthalates	dimethyl phthalate		Dimethyl phthalate, 1,2-Benzenedicarboxylic acid, dimethyl ester, Dimethylphthalate, Phthalic acid, dimethyl ester
120-61-6	Phthalates	dimethyl terephthalate		Dimethyl terephthalate, 1,4-Benzenedicarboxylic acid, dimethyl ester
124-40-3	VOCs	dimethylamine		Dimethylamine, Methanamine, N-methyl-
21436-96-4	SVOCs	dimethylaniline hydrochloride;2,4-		2,4-Dimethylaniline hydrochloride, 2,4-Xylidine.HCl
95-68-1	SVOCs	dimethylaniline;2,4-		
121-69-7	SVOCs	dimethylaniline;N,N-		
119-93-7	SVOCs	dimethylbenzidine;3,3'-		3,3'-Dimethylbenzidine, [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-, Benzidine, 3,3-Dimethyl-, o-Tolidine
68-12-2	VOCs	dimethylformamide;N,N-		N,N-Dimethylformamide, Formamide, N,N-dimethyl-
57-14-7	VOCs	dimethylhydrazine;1,1-		1,1-Dimethylhydrazine, Dimethylhydrazine;1,1-
540-73-8	VOCs	dimethylhydrazine;1,2-		1,2-Dimethylhydrazine, Dimethylhydrazine;1,2-
105-67-9	Phenols	dimethylphenol;2,4-		
576-26-1	Phenols	dimethylphenol;2,6-		
95-65-8	Phenols	dimethylphenol;3,4-		
99-65-0	Explosives	dinitrobenzene;m-		1,3-Dinitrobenzene, m-Dinitrobenzene, 1,3-DNB
528-29-0	SVOCs	dinitrobenzene;o-		o-Dinitrobenzene, 1,2-Dinitrobenzene, Benzene, 1,2-dinitro-
100-25-4	SVOCs	dinitrobenzene;p-		1,4-Dinitrobenzene
131-89-5	Phenols	dinitro-o-cyclohexyl phenol;4,6-		Dinex, Dinitro-o-cyclohexyl phenol;4,6-, Phenol, 2-cyclohexyl-4,6-dinitrophenol
51-28-5	Phenols	DINITROPHENOL;2,4-	pH-DEPENDENT	
25550-58-7	Phenols	dinitrophenols		
25321-14-6	SVOCs	dinitrotoluene mixture; 2,4-/2,6-		
121-14-2	Explosives	dinitrotoluene;2,4-		2,4-DNT
606-20-2	Explosives	dinitrotoluene;2,6-		2,6-DNT
117-84-0	Phthalates	di-n-octyl phthalate		Di-n-octyl phthalate, 1,2-Benzenedicarboxylic acid, 1,2-dioctyl ester, Di-n-octylphthalate, DnOP, Phthalic acid, dioctyl ester
88-85-7	Herbicides	dinoseb		DNBP
123-91-1	VOCs	dioxane;1,4-		1,4-Dioxane, 1,4-Diethyleneoxide, Dioxane, 1,4-
957-51-7	Pesticides	diphenamid		
122-39-4	SVOCs	diphenylamine		Diphenylamine, Benzenamine, N-phenyl-
122-66-7	SVOCs	diphenylhydrazine;1,2-		
85-00-7	Pesticides	diquat		Diquat Dibromide, Diquat
1937-37-7	Dyes	direct black 38		C.I. Direct Black 38, Direct Black 38
2602-46-2	Dyes	direct blue 6		C.I. Direct Blue 6, Direct Blue 6

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16071-86-6	Dyes	direct brown 95		C.I. Direct Brown 95, Direct Brown 95
2610-05-1	Dyes	direct sky blue		C.I. Direct Blue 1, tetrasodium salt, Direct sky blue
298-04-4	Pesticides	disulfoton		
505-29-3	SVOCs	dithiane;1,4-		1,4-Dithiane, Dithiane;1,4-
330-54-1	Pesticides (Carbamate)	diuron		Diuron, DCMU, Urea, N'-(3,4-dichlorophenyl)-N,N-dimethyl-
534-52-1	Phenols	DNOC		4,6-Dinitro-2-Methylphenol, 4,6-Dinitro-o-cresol, Dinitrocresol, Elgetol 30, Phenol, 2-methyl-4,6-dinitro-, Sinox
2439-10-3	Pesticides	dodine		Dodine, Guanidine, dodecyl-, monoacetate
115-29-7	Pesticides	endosulfan		
1031-07-8	Pesticides	endosulfan sulfate		
959-98-8	Pesticides	endosulfan;alpha		.alpha.-Endosulfan, Endosulfan I
33213-65-9	Pesticides	endosulfan;beta		.beta.-Endosulfan, Endosulfan II
145-73-3	Herbicides	endothall		Endothall, 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
72-20-8	Pesticides	endrin		
7421-93-4	Pesticides	endrin aldehyde		
106-89-8	VOCs	epichlorohydrin		Epichlorohydrin, Oxirane, 2-(chloromethyl)
106-88-7	VOCs	epoxybutane		1,2-Epoxybutane, 1,2-Butylene oxide
16672-87-0	Pesticides	ethephon		Ethephon, Phosphonic acid, (2-chloroethyl)-
563-12-2	Pesticides	ethion		
111-15-9	VOCs	ethoxyethanol acetate;2-		Ethylene glycol monoethyl ether acetate, Ethanol, 2-ethoxy-, acetate
110-80-5	VOCs	ethoxyethanol;2-		2-Ethoxyethanol, Ethylene glycol monoethyl ether
141-78-6	VOCs	ethyl acetate		
140-88-5	VOCs	ethyl acrylate		Ethyl acrylate, 2-Propenoic acid, ethyl ester
75-00-3	VOCs	ethyl chloride		Chloroethane
759-94-4	Pesticides	ethyl dipropylthiocarbamate;S-		EPTC, Eptam
60-29-7	VOCs	ethyl ether		Diethyl ether
97-63-2	VOCs	ethyl methacrylate		
2104-64-5	Pesticides	ethyl p-nitrophenyl phenylphosphorothioate		EPN
100-41-4	VOCs	ethylbenzene		
109-78-4	SVOCs	ethylene cyanohydrin		Ethylene cyanohydrin, Propanenitrile, 3-hydroxy-
107-15-3	SVOCs	ethylene diamine		Ethylenediamine, 1,2-Ethanediamine, Ethylene diamine
106-93-4	VOCs	ethylene dibromide (EDB)		Ethylene dibromide, 1,2-Dibromoethane, EDB, Ethane, 1,2-dibromo-
107-21-1	VOCs	ethylene glycol		Ethylene Glycol, 1,2-Ethanediol
111-76-2	Glycols	ethylene glycol monobutyl ether (EGBE)		Ethylene glycol monobutyl ether, Ethanol, 2-butoxy-
75-21-8	VOCs	ethylene oxide		Ethylene oxide, Oxirane
96-45-7	SVOCs	ethylene thiourea		
84-72-0	Phthalates	ethylphthalyl ethylglycolate		Ethoxycarbonylmethyl ethyl phthalate, 1,2-Benzenedicarboxylic acid, 2-ethoxy-2-oxoethyl-, ethyl ester, Ethylphthalyl ethylglycolate
101200-48-0	Pesticides	express		Tribenuron-methyl, Express
22224-92-6	Pesticides	fenamiphos		
115-90-2	Pesticides	fensulfothion		
2164-17-2	Pesticides	fluometuron		
206-44-0	PAHs	fluoranthene		Fluoranthene, Benzo[j,k]fluorene
86-73-7	PAHs	fluorene		
16984-48-8	Nutrients	FLUORIDE	FLUORIDE NOTES	
59756-60-4	Pesticides	fluridone		
56425-91-3	Pesticides	flurprimidol		Flurprimidol, 5-Pyrimidinemethanol, .alpha.-(1-methylethyl)-.alpha.-[4-(trifluoromethoxy)phenyl]-
66332-96-5	Pesticides	flutolanil		Flutolanil, Benzamide, N-[3-(1-methylethoxy)phenyl]-2-(trifluoromethyl)-
69409-94-5	Pesticides	fluvalinate		Fluvalinate, Valine, N-[2-chloro-4-(trifluoromethyl) phenyl]-, cyano(3-phenoxyphenyl)methyl ester
133-07-3	Pesticides	folpet		Folpet, 1H-Isoindole-1,3(2H)-dione, 2-[(trichloromethyl)thio]-
72178-02-0	Pesticides	fomesafen		Fomesafen, Benzamide, 5-[2-chloro-4-(trifluoromethyl) phenoxy]-N-(methylsulfonyl)- 2-nitro-
944-22-9	Pesticides	fonofos		
50-00-0	VOCs	formaldehyde		Formaldehyde, Methanal, Methyl aldehyde
64-18-6	VOCs	formic acid		
39148-24-8	Pesticides	fosetyl-al		Fosetyl-Al, Phosphonic acid, monoethyl ester, aluminum salt
110-00-9	Furans	furan		

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67-45-8	SVOCs	furazolidone		Furazolidone, 2-Oxazolidinone, 3-[[(5-nitro-2-furanyl)methylene] amino]-
98-01-1	VOCs	furfural		Furfural, 2-Furancarboxaldehyde
531-82-8	SVOCs	furium		Furothiazole, Acetamide, N-[4-(5-nitro-2-furanyl)-2- thiazolyl]-, Furium
60568-05-0	Pesticides	furmecyclox		Furmecyclox, 3-Furancarboxamide, N-cyclohexyl-N-methoxy-2,5- dimethyl-
77182-82-2	SVOCs	glufosinate-ammonium		Glufosinate-ammonium, Butanoic acid, 2-amino-4-(hydroxymethylphosphinyl)-, monoammonium salt
765-34-4	VOCs	glycidaldehyde		Glycidylaldehyde, Oxiranecarboxaldehyde, glycidyl
1071-83-6	SVOCs	glyphosate		Glyphosate, Glycine, N-(phosphonomethyl)-
unavailable20	Radionuclides	gross alpha particle activity	ALPHA PARTICLE NOTE	
unavailable21	Radionuclides	gross beta particle activity	BETA PARTICLE NOTE	
86-50-0	Pesticides	guthion		Azinphos-methyl, Guthion, Phosphorodithioic acid, O,O-dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl] ester
69806-40-2	Pesticides	haloxyfop-methyl		Haloxyfop-methyl, Propanoic acid, 2-[4-[[3-chloro-5-(trifluoromethyl)- 2-pyridinyl]oxy]phenoxy]-, methyl ester
79277-27-3	Pesticides	harmony		Thifensulfuron-methyl, Harmony
76-44-8	Pesticides	heptachlor		
1024-57-3	Pesticides	heptachlor epoxide		
142-82-5	VOCs	heptane;n-		
87-82-1	SVOCs	hexabromobenzene		
68631-49-2	PBDEs	hexabromodiphenyl ether; 2,2',4,4',5,5'-		PBDE-153, 2,2',4,4',5,5'-Hexabromodiphenyl ether, Benzene, 1,1'-oxybis[2,4,5-tribromo-
118-74-1	Pesticides	hexachlorobenzene		Hexachlorobenzene, Benzene, 1,2,3,4,5,6-hexachloro-
87-68-3	VOCs	hexachlorobutadiene		Hexachlorobutadiene, 1,3-Butadiene, 1,1,2,3,4,4-hexachloro-, Hexachloro-1,3-butadiene
319-84-6	Pesticides	hexachlorocyclohexane;alpha		alpha-BHC, .alpha.-Benzene hexachloride, .alpha.-BHC, alpha-Hexachlorocyclohexane, Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1.alpha.,2.alpha.,3.beta.,4.alpha.,5.beta.,6.beta.)-
319-85-7	Pesticides	hexachlorocyclohexane;beta-		beta-BHC, .beta.-Benzene hexachloride, .beta.-BHC, beta-Hexachlorocyclohexane, Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1.alpha.,2.beta.,3.alpha.,4.beta.,5.alpha.,6.beta.)-
319-86-8	Pesticides	hexachlorocyclohexane;delta-		delta-BHC, Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1.alpha.,2.alpha.,3.alpha.,4.beta.,5.alpha.,6.beta.)-, delta-Hexachlorocyclohexane
608-73-1	SVOCs	hexachlorocyclohexane;technical		
77-47-4	Pesticides	hexachlorocyclopentadiene		
19408-74-3	Dioxins	hexachlorodibenzo-p-dioxin, mixture		1,2,3,7,8,9-HxCDD, 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
67-72-1	VOCs	hexachloroethane		
70-30-4	SVOCs	hexachlorophene		
822-06-0	VOCs	hexamethylene diisocyanate;1,6-		Hexamethylene-1,6-diisocyanate, Hexane, 1,6-diisocyanato-
110-54-3	VOCs	hexane;n-		Hexane, n-Hexane
591-78-6	VOCs	hexanone;2-		
51235-04-2	Pesticides	hexazinone		
302-01-2	VOCs	hydrazine		
10034-93-2	SVOCs	hydrazine sulfate		Hydrazine sulfate, Hydrazine sulfate (1:1)
7647-01-0	VOCs	hydrogen chloride		Hydrochloric acid, Hydrogen chloride
74-90-8	Cyanides	hydrogen cyanide		Hydrogen cyanide, Hydrocyanic acid
7783-06-4	VOCs	hydrogen sulfide		
123-31-9	SVOCs	hydroquinone		Hydroquinone, 1,4-Benzenediol
35554-44-0	Pesticides	imazalil		Imazalil, 1H-Imidazole, 1-[2-(2,4-dichlorophenyl)- 2-(2-propenyloxy)ethyl]-
81335-37-7	Pesticides	imazaquin		Imazaquin, 3-Quinolinecarboxylic acid, 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol- 2-yl]-
193-39-5	cPAHs	INDENO[1,2,3-cd]PYRENE	PAH NOTES	Indeno(1,2,3-cd)pyrene, Indeno(1,2,3-c,d)pyrene, Indeno[1,2,3-cd]pyrene
36734-19-7	Pesticides	iprodione		Iprodione, 1-Imidazolidinecarboxamide, 3-(3,5-dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-
7439-89-6	Metals	iron		Iron, Iron, total
78-83-1	VOCs	isobutyl alcohol		
78-59-1	SVOCs	isophorone		
33820-53-0	Pesticides	isopropalin		Isopropalin, Benzenamine, 4-(1-methylethyl)-2,6-dinitro- N,N-dipropyl-
1832-54-8	SVOCs	isopropyl methyl phosphonic acid		Monoisopropyl methylphosphonate, Isopropyl methyl phosphonic acid, Phosphonic acid, methyl-, mono(1-methylethyl) ester
82558-50-7	Pesticides	isoxaben		Isoxaben, Benzamide, N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxy-
77501-63-4	Pesticides	lactofen		Lactofen, Benzoic acid, 5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-nitro-, 2-ethoxy-1-methyl-2-oxoethyl ester
7439-92-1	Metals	LEAD	LEAD NOTES	
unavailable02	Metals	lead alkyls		
58-89-9	Pesticides	lindane		Lindane, Benzene hexachloride, Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1.alpha.,2.alpha.,3.beta.,4.alpha.,5.alpha.,6.beta.)-, gamma-BHC, gamma-Hexachlorocyclohexane
330-55-2	Pesticides (Carbamate)	linuron		Linuron, Urea, N'-(3,4-dichlorophenyl)-N-methoxy-N-methyl-
7791-03-9	Perchlorates	lithium perchlorate		Lithium perchlorate, Perchloric acid, lithium salt \
83055-99-6	Pesticides	londax		Bensulfuron-methyl, Londax

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121-75-5	Pesticides	malathion		
108-31-6	SVOCs	maleic anhydride		Maleic anhydride, 2,5-Furandione
123-33-1	SVOCs	maleic hydrazide		Maleic hydrazide, 3,6-Pyridazinedione, 1,2-dihydro-
109-77-3	VOCs	malononitrile		Malononitrile, Propanedinitrile
8018-01-7	Pesticides	mancozeb		Mancozeb, Manganese, [[2-[(dithiocarboxy)amino] ethyl]carbamodithioato(2-)-. kappa.S,.kappa.S']-, mixt. with [[2-[(dithiocarboxy)amino] ethyl]carbamodithioato(2-)-. kappa.S,.kappa.S']zinc
12427-38-2	Pesticides	maneb		Maneb, Manganese, [[2-[(dithiocarboxy)amino] ethyl]carbamodithioato(2-)-. kappa.S,.kappa.S']-
7439-96-5	Metals	MANGANESE (Diet)	MANGANESE NOTES	
7439-96-5a	Metals	MANGANESE (Non-Diet)	MANGANESE NOTES	
950-10-7	Pesticides	mephosfolan		Mephosfolan, Phosphoramidic acid, (4-methyl-1,3-dithiolan-2- ylidene)-, diethyl ester
24307-26-4	Pesticides	mepiquat chloride		Mepiquat chloride, Piperidinium, 1,1-dimethyl-, chloride
7487-94-7	Metals	mercuric chloride		Mercuric chloride, Mercury chloride (HgCl2)
7439-97-6	Metals	mercury		
150-50-5	Pesticides	merphos		Merphos, Phosphorotrithious acid, tributyl ester
57837-19-1	Pesticides	metalaxyl		
126-98-7	VOCs	methacrylonitrile		
10265-92-6	Pesticides	methamidosphos		Methamidophos, Acephate-met, Monitor, Phosphoramidothioic acid, O,S-dimethyl e
67-56-1	VOCs	methanol		
950-37-8	Pesticides	methidathion		
16752-77-5	Pesticides (Carbamate)	methomyl		Methomyl, Ethanimidothioic acid, N-[[(methylamino)carbonyl]oxy]-, methyl ester
99-59-2	SVOCs	methoxy-5-nitroaniline;2-		2-Methoxy-5-nitroaniline, Benzenamine, 2-methoxy-5-nitro-, 5-Nitro-o-anisidine
72-43-5	Pesticides	methoxychlor		
110-49-6	VOCs	methoxyethanol acetate;2-		2-Methoxyethanol acetate, Ethanol, 2-methoxy-, acetate
109-86-4	VOCs	methoxyethanol;2-		2-Methoxyethanol, Ethanol, 2-methoxy-, Ethylene glycol monomethyl ether, Methyl cellosolve
79-20-9	VOCs	methyl acetate		
96-33-3	VOCs	methyl acrylate		
78-93-3	VOCs	methyl ethyl ketone		Methyl ethyl ketone, 2-Butanone, MEK
108-10-1	VOCs	methyl isobutyl ketone		Methyl isobutyl ketone, 2-Pentanone, 4-methyl-, 4-Methyl-2-pentanone, Hexone, MIBK
22967-92-6	Metals (organometallic)	METHYL MERCURY	METHYL MERCURY NOTES	Methyl mercury, Methylmercury, Methylmercury(1+)
80-62-6	VOCs	methyl methacrylate		
90-12-0	PAHs	methyl naphthalene;1-		1-Methylnaphthalene, Naphthalene, 1-methyl-
91-57-6	PAHs	methyl naphthalene;2-		2-Methylnaphthalene, Naphthalene, 2-methyl-
298-00-0	Pesticides	methyl parathion		Methyl Parathion, Phosphorothioic acid, O,O-dimethyl O-(4-
25013-15-4	VOCs	methyl styrene		Vinyl toluene, Benzene, ethenylmethyl-, Methyl styrene
98-83-9	SVOCs	methyl styrene, alpha		.alpha.-Methylstyrene, Benzene, (1-methylethenyl)-, Methyl styrene, alpha
1634-04-4	VOCs	methyl tert-butyl ether		Methyl t-butyl ether, MTBE, Propane, 2-methoxy-2-methyl-
94-74-6	Herbicides	methyl-4-chlorophenoxy-acetic acid;2-		MCPA, Acetic acid, (4-chloro-2-methylphenoxy)-, MCPA acid
99-55-8	SVOCs	methyl-5-nitroaniline;2-		5-Nitro-o-toluidine
636-21-5	SVOCs	methylaniline hydrochloride;2-		o-Toluidine hydrochloride, Benzenamine, 2-methyl-, hydrochloride (1:1), methylaniline hydrochloride;2-
95-53-4	VOCs	methylaniline;2-		o-Toluidine, 2-Aminotoluene, Benzenamine, 2-methyl
108-87-2	VOCs	methylcyclohexane		
101-14-4	SVOCs	methylene bis(2-chloroaniline);4,4'-		
101-61-1	SVOCs	methylene bis(n,n'-dimethyl)aniline;4,4'-		4,4'-Methylenebis[N,N-dimethylaniline], Benzenamine, 4,4'-methylenebis[N,N- dimethyl-
74-95-3	VOCs	methylene bromide		dibromomethane
75-09-2	VOCs	methylene chloride		Methylene Chloride, Dichloromethane, Methane, dichloro-, DCM
101-68-8	SVOCs	methylene diphenyl diisocyanate (MDI)		4,4'-Methylenedi(phenyl isocyanate), Benzene, 1,1'-methylenebis[4-isocyanato-
9016-87-9	SVOCs	methylene diphenyl diisocyanate (PMDI)		Polymeric diphenylmethane diisocyanate, Isocyanic acid, polymethylenepolyphenylene ester
101-77-9	SVOCs	methylenebisbenzenamine;4,4-		4,4'-Methylenedianiline, Benzenamine, 4,4'-methylenebis-
60-34-4	VOCs	methylhydrazine		Methyl hydrazine, Methylhydrazine
51218-45-2	Pesticides	metolachlor		
21087-64-9	Pesticides	metribuzin		
7786-34-7	Pesticides	mevinphos		phosdrin
2385-85-5	Pesticides	mirex		Mirex, Dechlorane
2212-67-1	Pesticides	molinate		
7439-98-7	Metals	molybdenum		

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10599-90-3	Disinfectants	monochloramine	MCL FOR DISINFECTANTS	Chloramine, Chloramide, Monochloramine
unavailable03	SVOCs	monochlorobutanes (not in HSDB)		
300-76-5	Pesticides	naled		Naled, Phosphoric acid, 1,2-dibromo-2,2-dichloroethyl dimethyl ester
91-20-3	PAHs	naphthalene		Naphthalene, Aromatic oil #2, Aromatic oil #3, Napthalene, Tar Camphor
15299-99-7	Pesticides	napropamide		
104-51-8	VOCs	n-butylbenzene		n-Butylbenzene, Benzene, butyl-
2429-74-5	Dyes	niagara blue 4B		C.I. Direct Blue 15, Niagara blue 4b
unavailable04	Metals	nickel refinery dust		
7440-02-0	Metals	NICKEL SOLUBLE SALTS	HARDNESS - DEPENDENT	
12035-72-2	Metals	nickel subsulfide		Nickel subsulfide, Nickel sulfide (Ni3S2)
14797-55-8	Nutrients	nitrate		Nitrate, Nitrogen, nitrate total (as NO3)
10102-43-9	Gases	nitric oxide		Nitric oxide, Nitrogen oxide (NO)
14797-65-0	Nutrients	nitrite		
88-74-4	SVOCs	nitroaniline, 2-		2-Nitroaniline, o-Nitroaniline
100-01-6	SVOCs	nitroaniline, 4-		4-Nitroaniline, p-Nitroaniline
98-95-3	Explosives	nitrobenzene		NB
67-20-9	SVOCs	nitrofurantoin		Nitrofurantoin, 2,4-Imidazolidinedione, 1-[[(5-nitro-2-furanyl)methylene]amino]-
59-87-0	SVOCs	nitrofurazone		Nitrofurazone, Hydrazinecarboxamide, 2-[(5-nitro-2-furanyl)methylene]-
10102-44-0	Gases	nitrogen dioxide		Nitrogen dioxide, Nitrogen oxide (NO2)
556-88-7	SVOCs	nitroguanidine		
79-46-9	VOCs	nitropropane;2-		
1116-54-7	SVOCs	nitrosodiethanolamine;N-		
55-18-5	SVOCs	nitrosodiethylamine;N-		
62-75-9	SVOCs	nitrosodimethylamine;N-		N-Nitrosodimethylamine, Methanamine, N-methyl-N-nitroso-, NDMA
924-16-3	VOCs	nitroso-di-n-butylamine;N-		
621-64-7	SVOCs	nitroso-di-n-propylamine;N-		N-Nitrosodi-n-propylamine, Di-n-propylnitrosamine, N-Nitrosodipropylamine
86-30-6	SVOCs	nitrosodiphenylamine;N-		
4549-40-0	SVOCs	nitrosomethylvinylamine,n-		
759-73-9	SVOCs	nitroso-n-ethylurea;n-		N-Nitroso-N-ethylurea, nitroso-n-ethylurea;n-, Urea, N-ethyl-N-nitroso-
10595-95-6	SVOCs	nitroso-N-methylethylamine;N-		N-Nitrosomethylethylamine
684-93-5	SVOCs	nitroso-n-methylurea,n-		N-Nitroso-N-methylurea, nitroso-n-methylurea,n-, Urea, N-methyl-N-nitroso-
930-55-2	SVOCs	nitrosopyrrolidine;N-		N-Nitrosopyrrolidine
99-08-1	Explosives	nitrotoluene, m-		3-Nitrotoluene, 3-NT
88-72-2	Explosives	nitrotoluene, o-		2-Nitrotoluene, 2-NT
99-99-0	Explosives	nitrotoluene, p-		4-Nitrotoluene, 4-NT
1321-12-6	Explosives	nitrotoluenes;o-,m-,p-		Nitrotoluene, Benzene, methylnitro-, Nitrotoluene, m-, o-, or p-
84852-15-3	Phenols	nonylphenol		4-Nonylphenol branched, 4-Nonylphenol, mixed isomers, Branched p-nonylphenol, Phenol, 4-nonyl-, branched
27314-13-2	Pesticides	norflurazon		
85509-19-9	Herbicides	nustar		Flusilazole, 1H-1,2,4-Triazole, 1-[[bis(4-fluorophenyl)methylsilyl] methyl]-, NuStar
32536-52-0	PBDEs	octabromodiphenyl ether		PBDE, Octabromodiphenyl ethers, Benzene, 1,1'-oxybis-, octabromo deriv., Total octabromodiphenyl ethers
2691-41-0	Explosives	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine		HMX
152-16-9	SVOCs	octamethylpyrophosphoramide		Schradan, Octamethylpyrophosphoramide
19044-88-3	Pesticides	oryzalin		
19666-30-9	Pesticides	oxadiazon		Oxadiazon, Oxydiazon
23135-22-0	Pesticides (Carbamate)	oxamyl		Oxamyl, Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester, Vydate
42874-03-3	Pesticides	oxyfluorfen		goal
76738-62-0	Herbicides	paclobutrazol		Paclobutrazol, 1H-1,2,4-Triazole- 1-ethanol, .beta.-[(4-chlorophenyl)methyl]-. alpha.-(1,1-dimethylethyl)-, (.alpha.R,.beta.R)-rel-
unavailable05	PAHs	PAHs	PAH NOTES	
4685-14-7	Pesticides	paraquat		Paraquat, 4,4'-Bipyridinium, 1,1'-dimethyl-, Paraquat dication, Paraquat ion
56-38-2	Pesticides	parathion		Parathion, Ethyl parathion, Phosphorothioic acid, O,O-diethy O-(p-ni
1114-71-2	Pesticides	pebulate		
40487-42-1	Pesticides	pendimethalin		
87-84-3	SVOCs	pentabromo-6-chloro-cyclohexane;1,2,3,4,5-		
60348-60-9	PBDEs	pentabromodiphenyl ether; 2,2',4,4',5-		PBDE-099, BDE-99, 2,2',4,4',5-Pentabromodiphenyl ether, Benzene, 1,2,4-tribromo-5-(2,4-dibromophenoxy)-

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32534-81-9	PBDEs	pentabromodiphenyl ethers		Pentabromodiphenyl ether, Benzene, 1,1'-oxybis-, pentabromo deriv., Bromkal 70, DE-71, Pentabromobiphenyl ether, Pentabromodiphenyl oxide, Tardex 50
608-93-5	SVOCs	pentachlorobenzene		Pentachlorobenzene, Benzene, 1,2,3,4,5-pentachloro-, Benzene, pentachloro-
82-68-8	Pesticides	pentachloronitrobenzene		Pentachloronitrobenzene, PCNB
87-86-5	Herbicides	PENTACHLOROPHENOL	pH-DEPENDENT	Pentachlorophenol, Dowicide 7, PCP
14797-73-0	Perchlorates	perchlorate and perchlorate salts		
52645-53-1	Pesticides	permethrin		Permethrin, Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-, (3-phenoxyphenyl) methyl ester, Permethrin, mixed cis, trans
72-56-0	Pesticides	perthane		Perthane, Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-ethyl-, Ethylan
unavailable19	General Chemistry	pH	pH NOTES	
85-01-8	PAHs	phenanthrene		
13684-63-4	Pesticides	phenmedipham		Phenmedipham, Carbamic acid, (3-methylphenyl)-, 3-[(methoxycarbonyl)amino] phenyl ester
108-95-2	Phenols	phenol		Phenol, Benzene, hydroxy-, Carbolic acid
106-50-3	SVOCs	phenylenediamine, p-		1,4-Benzenediamine, p-Phenylenediamine, 1,4-Phenylenediamine
108-45-2	SVOCs	phenylenediamine;m-		
95-54-5	SVOCs	phenylenediamine;o-		1,2-Phenylenediamine, 1,2-Benzenediamine, o-Phenylenediamine
62-38-4	Metals (organometallic)	phenylmercuric acetate		Phenylmercury Acetate, Mercury, (acetato-.kappa.O) phenyl-, PMA
90-43-7	Phenols	phenylphenol;2-		[1,1'-Biphenyl]-2-Ol, 2-Phenylphenol, o-Biphenylol
298-02-2	Pesticides	phorate		
75-44-5	VOCs	phosgene		Phosgene, Carbonic dichloride
732-11-6	Pesticides	phosmet		Phosmet, Imidan, Phosphorodithioic acid, S-[(1,3-dihydro-1,3-dioxo-2H-isoindol-2-yl)methyl] O,O-dimethyl ester
7803-51-2	Gases	phosphine		Phosphine, Hydrogen phosphide
7664-38-2	SVOCs	phosphoric acid		
7723-14-0	Metals	phosphorus		
100-21-0	Phthalates	phthalic acid;p-		Terephthalic acid, 1,4-Benzenedicarboxylic acid, p-Phthalic acid
85-44-9	Phthalates	phthalic anhydride		Phthalic Anhydride, 1,3-Isobenzofurandione
1918-02-1	Herbicides	picloram		Picloram, 2-Pyridinecarboxylic acid, 4-amino-3,5,*
29232-93-7	Pesticides	pirimiphos-methyl		Pirimiphos-methyl, Phosphorothioic acid, O-[2-(diethylamino)-6-methyl-4-pyrimidinyl] O,O-dimethyl ester
59536-65-1	PBBs	polybrominated biphenyls		FireMaster BP 6, Hexabromobiphenyl, Polybrominated biphenyls
1336-36-3	PCBs	polychlorinated biphenyls (PCBs)		
151-50-8	Cyanides	potassium cyanide		Potassium cyanide, Potassium cyanide (K(CN))
7778-74-7	Perchlorates	potassium perchlorate		Potassium perchlorate, Perchloric acid, potassium salt
506-61-6	Cyanides	potassium silver cyanide		Potassium silver cyanide, Argentate(1-), bis(cyano-.kappa.C)-, potassium (1:1)
67747-09-5	Pesticides	prochloraz (not in HSDB)		Prochloraz, 1H-Imidazole-1-carboxamide, N-propyl-N-[2-(2,4,6-trichlorophenoxy) ethyl]-
26399-36-0	Pesticides	profluralin		
1610-18-0	Pesticides	prometon		Prometon, Pramitol
7287-19-6	Pesticides	prometryn		
23950-58-5	Pesticides	pronamide		Pronamide (Kerb), Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-, KERB
1918-16-7	Pesticides	propachlor		Ramrod
709-98-8	Pesticides	propanil		Propanil, Propanamide, N-(3,4-dichlorophenyl)-
2312-35-8	Pesticides	propargite		Propargite, Sulfurous acid, 2-[4-(1,1-dimethylethyl)phenoxy]cyclohexyl 2-propynyl ester, Propargite (S-181)
107-19-7	VOCs	propargyl alcohol		Propargyl alcohol, 2-Propyn-1-ol
139-40-2	Pesticides	propazine		
122-42-9	Pesticides	propham		Propham, Carbamic acid, phenyl-, 1-methylethyl ester
60207-90-1	Pesticides	propiconazole		Propiconazole, 1H-1,2,4-Triazole, 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-
123-38-6	VOCs	propionaldehyde		
93-65-2	Herbicides	propionic acid;(2-methyl-4-chlorophenoxy)2-		Mecoprop, MCPP, Propanoic acid, 2-(4-chloro-2-methylphenoxy)-
103-65-1	VOCs	propylbenzene;n-		
57-55-6	Glycols	propylene glycol		
6423-43-4	Glycols	propylene glycol dinitrate;1,2-		
52125-53-8	Glycols	propylene glycol monoethyl ether		1(or 2)-Ethoxypropanol, Propanol, 1(or 2)-ethoxy-, Propylene glycol ethyl ether
107-98-2	Glycols	propylene glycol monomethyl ether		Propylene glycol 1-methyl ether, 2-Propanol, 1-methoxy-, Propylene glycol monomethyl ether
75-56-9	VOCs	propylene oxide		Propylene oxide, Oxirane, 2-methyl-
81335-77-5	Pesticides	pursuit		Imazethapyr, 3-Pyridinecarboxylic acid, 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-ethyl-, Pursuit
51630-58-1	Pesticides	pydrin		Fenvalerate, Sumicide
129-00-0	PAHs	pyrene		Pyrene, Benzo[def]phenanthrene

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110-86-1	VOCs	pyridine		
13593-03-8	Pesticides	quinalphos		Quinalphos, Phosphorothioic acid, O,O-diethyl O-2-quinoxalinyl ester
91-22-5	SVOCs	quinoline		Quinoline, Benzo[b]pyridine
13982-63-3	Radionuclides	radium 226	RADIUM 226 NOTE	Radium-226, Radium 226, Radium, isotope of mass 226
unavailable23	Radionuclides	radium 226 and 228	RADIUM 226 & 228 NOTES	
121-82-4	Explosives	rdx		hexahydro-1,3,5-trinitro-1,3,5-triazine
unavailable07	Fibers	REFRACTORY CERAMIC FIBERS	REFRACTORY FIBER NOTE	
10453-86-8	Pesticides	resmethrin		
299-84-3	Pesticides	ronnel		
83-79-4	Pesticides	rotenone		
78-48-8	Pesticides	s,s;s-tributylphosphorotrithioate		merphos oxide, DEF (Butifos)
78587-05-0	Pesticides	savey		Hexythiazox, Savey
135-98-8	VOCs	sec-butylbenzene		Sec-Butylbenzene, Benzene, (1-methylpropyl)-
7783-00-8	Metals	selenious acid		
7782-49-2	Metals	selenium and compounds		
630-10-4	Metals (organometallic)	selenourea		
74051-80-2	Pesticides	sethoxydim		Sethoxydim, 2-Cyclohexen-1-one, 2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-
7440-22-4	Metals	SILVER	HARDNESS - DEPENDENT	
506-64-9	Cyanides	silver cyanide		
122-34-9	Pesticides	simazine		
26628-22-8	Metals	sodium azide		
143-33-9	Cyanides	sodium cyanide		
148-18-5	Metals (organometallic)	sodium diethyldithiocarbamate		Sodium diethyldithiocarbamate, Carbamodithioic acid, diethyl-, sodium salt
62-74-8	Metals (organometallic)	sodium fluoroacetate		Sodium Fluoroacetate, 1080, Acetic acid, fluoro-, sodium salt
13718-26-8	Metals	sodium metavanadate		Sodium vanadate, Sodium metavanadate, Vanadate (VO31-), sodium
7601-89-0	Perchlorates	sodium perchlorate		Sodium perchlorate, Perchloric acid, sodium salt
7440-24-6	Metals	strontium		
57-24-9	SVOCs	strychnine		Strychnine, Strychnidin-10-one
100-42-5	VOCs	styrene		Styrene, Benzene, ethenyl-
unavailable17	Metals	sulfate		
88671-89-0	Pesticides	systhane		Myclobutanil, 1H-1,2,4-Triazole-1-propanenitrile, .alpha.-butyl-.alpha.-(4-chlorophenyl)-, Systhane
1746-01-6	Dioxins	TCDD;2,3,7,8- (LOW ORGANIC) (DIOXIN)	TEF NOTES	2,3,7,8-TCDD, 2,3,7,8-Tetrachlorodibenzo-p-dioxin
34014-18-1	Pesticides	tebuthiuron		
3383-96-8	Pesticides	temephos		
5902-51-2	Pesticides	terbacil		
13071-79-9	SVOCs	terbufos		
886-50-0	Pesticides	terbutryn		
98-06-6	VOCs	tert-butylbenzene		
5436-43-1	PBDEs	tetrabromodiphenyl ether 2,2',4,4'		PBDE-047, BDE-47, 2,2',4,4' - tetrabromodiphenyl ether, Benzene, 1,1'-oxybis[2,4-dibromo-
95-94-3	SVOCs	tetrachlorobenzene;1,2,4,5-		
630-20-6	VOCs	tetrachloroethane;1,1,1,2-		
79-34-5	VOCs	tetrachloroethane;1,1,2,2-		1,1,2,2-Tetrachloroethane, 1,1,2,2-PCA, Ethane, 1,1,2,2-tetrachloro-
127-18-4	VOCs	TETRACHLOROETHYLENE (PCE)	PCE NOTES	Tetrachloroethene, Ethene, 1,1,2,2-tetrachloro-, PCE, Perc, Perchloroethene, Perchloroethylene, Tetrachloroethylene
58-90-2	Phenols	TETRACHLOROPHENOL;2,3,4,6-	pH-DEPENDENT	
5216-25-1	VOCs	tetrachlorotoluene;p,a,a,a,-		4-Chlorobenzotrichloride, Benzene, 1-chloro-4-(trichloromethyl)-, p,a,a,a-Tetrachlorotoluene
961-11-5	Pesticides	tetrachlorvinphos		stirofos, gardona
3689-24-5	Pesticides	tetraethyl dithiopyrophosphate		
78-00-2	Metals (organometallic)	tetraethyl lead		Tetraethyllead, Plumbane, tetraethyl-, Tetraethyl lead
811-97-2	VOCs	tetrafluoroethane;1,1,1,2-		HFC-134a, Ethane, 1,1,1,2-tetrafluoro-
109-99-9	Furans	tetrahydrofuran		Tetrahydrofuran, Diethylene oxide, Tetramethylene oxide
1314-32-5	Metals	thallic oxide		Thallic oxide, Thallium oxide (Tl2O3), Thallium(III) oxide
563-68-8	Metals	thallium acetate		Thallium acetate, Acetic acid, thallium(1+) salt (1:1), Thallium(I) acetate
6533-73-9	Metals	thallium carbonate		Thallium(I) carbonate, Carbonic acid, dithallium(1+) salt, Thallium carbonate
7791-12-0	Metals	thallium chloride		Thallium chloride, Thallium(I) chloride, Thallous chloride

Cleanup Levels and Risk Calculation (CLARC) Master Table - May 2019

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Chemical Synonyms Compiled from Ecology's Environmental Information Management System (EIM) Database
10102-45-1	Metals	thallium nitrate		Thallium nitrate, Nitric acid, thallium(1+) salt (1:1), Thallium(I) nitrate
12039-52-0	Metals	thallium selenite		Thallium(I) selenite, Selenious acid, dithallium(1+) salt
7446-18-6	Metals	thallium(I) sulfate		Thallium sulfate, Sulfuric acid, thallium(1+) salt (1:2), Thallium(I) sulfate
7440-28-0	Metals	thallium, soluble salts		
28249-77-6	Pesticides	thiobencarb		Thiobencarb, Benthiocarb, Carbamothioic acid, diethyl-, S-[(4-chlorophenyl)methyl] ester
21564-17-0	SVOCs	thiocyanomethylthiobenzothiazole;2-		TCMTB
39196-18-4	Pesticides	thiofanox		Thiofanox, 2-Butanone, 3,3-dimethyl-1-(methylthio)*
23564-05-8	Pesticides	thiophanate-methyl		Thiophanate-methyl, Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester
137-26-8	Pesticides	thiram		Thiram, Thioperoxydicarbonic diamide ([(H2N)C(S)]2S2), N,N,N',N'-tetramethyl-
7440-31-5	Metals	tin		
118-96-7	Explosives	tnt		Trinitrotoluene, Benzene, 2-methyl-1,3,5-trinitro-, trinitrotoluene, 2,4,6-, 2,4,6-TNT
108-88-3	VOCs	toluene		Toluene, Benzene, methyl-
26471-62-5	VOCs	toluene diisocyanate mixture;2,4-/2,6-		Toluene Diisocyanate, Benzene, 1,3-diisocyanatomethyl-
584-84-9	VOCs	toluene-2,4-diisocyanate		Benzene, 2,4-diisocyanato-1-methyl-, 2,4-Toluene diisocyanate
91-08-7	VOCs	toluene-2,6-diisocyanate		
95-80-7	SVOCs	toluenediamine;2,4-		2,4-Toluenediamine, 1,3-Benzenediamine, 4-methyl-, 2,4-Diaminotoluene
95-70-5	SVOCs	toluenediamine;2,5-		
823-40-5	SVOCs	toluenediamine;2,6-		2,6-Toluenediamine, 1,3-Benzenediamine, 2-methyl-
106-49-0	SVOCs	toluidine;p-		p-Toluidine, Benzenamine, 4-methyl-
unavailable18	General Chemistry	total dissolved solids		
8001-35-2	Pesticides	toxaphene		
93-72-1	Herbicides	tp;2,4,5-		fenoprop, Silvex, 2,4,5-TP, 2-(2,4,5-trichlorophenoxy)-propionic acid
unavailable09	Petroleum	tph, diesel range organics		
unavailable10	Petroleum	tph, heavy oils		
unavailable11	Petroleum	tph, mineral oils		
unavailable25	Petroleum	tph: gasoline range organics, benzene present		
unavailable08	Petroleum	tph: gasoline range organics, no detectable benzene		
66841-25-6	Pesticides	tralomethrin		Tralomethrin, Cyclopropanecarboxylic acid, 2,2-dimethyl-3-(1,2,2,2-tetrabromoethyl)-, cyano(3-phenoxyphenyl)methyl ester, Scout X-tra
2303-17-5	Pesticides	triallate		
82097-50-5	Pesticides	triasulfuron		Triasulfuron, 1-[2-(2-chloroethoxy)phenylsulfonyl]-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea
615-54-3	VOCs	tribromobenzene;1,2,4-		
688-73-3	Organotins	tributyltin		Tributyltin, Stannane, tributyl-, Tributyl tin, TBT
56-35-9	Organotins	tributyltin oxide		
10025-85-1	Disinfectants	trichloramine	MCL FOR DISINFECTANTS	Nitrogen chloride
76-13-1	VOCs	trichloro-1,2,2-trifluoroethane;1,1,2-		CFC-113, 1,1,2-Trichlorotrifluoroethane, Ethane, 1,1,2-trichloro-1,2,2-trifluoro-, Freon 113
76-03-9	SVOCs	trichloroacetic acid		
33663-50-2	SVOCs	trichloroaniline hydrochloride;2,4,6-		2,4,6-Trichloroaniline hydrochloride, Benzenamine, 2,4,6-trichloro-, hydrochloride
634-93-5	SVOCs	trichloroaniline;2,4,6-		2,4,6-Trichloroaniline, Benzenamine, 2,4,6-trichloro-
120-82-1	VOCs	trichlorobenzene;1,2,4-		1,2,4-Trichlorobenzene, Benzene, 1,2,4-trichloro-
71-55-6	VOCs	trichloroethane;1,1,1-		
79-00-5	VOCs	trichloroethane;1,1,2-		1,1,2-Trichloroethane, 1,1,2-TCA, Ethane, 1,1,2-trichloro-
79-01-6	VOCs	TRICHLOROETHYLENE (TCE)	TCE NOTES	Trichloroethene, Ethene, trichloro-, TCE, Trichloroethylene
75-69-4	VOCs	trichlorofluoromethane		CFC-11, Freon 11, Methane, trichlorofluoro-, Trichlorofluoromethane
95-95-4	Phenols	TRICHLOROPHENOL;2,4,5-	pH-DEPENDENT	
88-06-2	Phenols	TRICHLOROPHENOL;2,4,6-	pH-DEPENDENT	2,4,6-Trichlorophenol, Phenol, 2,4,6-trichloro-
93-76-5	Herbicides	trichlorophenoxyacetic acid;2,4,5-		2,4,5-T, Acetic acid, (2,4,5-trichlorophenoxy)-
598-77-6	VOCs	trichloropropane;1,1,2-		1,1,2-Trichloropropane, Trichloropropane;1,1,2-
96-18-4	VOCs	trichloropropane;1,2,3-		
96-19-5	VOCs	trichloropropene;1,2,3-		1,2,3-Trichloropropene, Trichloropropene;1,2,3-
58138-08-2	Pesticides	tridiphane		Tridiphane, Oxirane, 2-(3,5-dichlorophenyl)-2-(2,2,2-trichloroethyl)-
121-44-8	VOCs	triethylamine		Triethylamine, Ethanamine, N,N-diethyl-
1582-09-8	Pesticides	trifluralin		Trifluralin, Benzenamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-, Treflan
unavailable13	VOCs	trihalomethanes, (total) (TTHMs)	TTHM NOTES	
512-56-1	SVOCs	trimethyl phosphate		Trimethyl phosphate, Phosphoric acid, trimethyl ester
526-73-8	VOCs	trimethylbenzene;1,2,3-		
95-63-6	VOCs	trimethylbenzene;1,2,4-		
108-67-8	VOCs	trimethylbenzene;1,3,5-		

CAS #	Chemical Data Group	Chemical Name	Links to Important Notes	Chemical Synonyms Compiled from Ecology's Environmental Information Management System (EIM) Database
99-35-4	Explosives	trinitrobenzene;1,3,5-		1,3,5-TNB
479-45-8	Explosives	trinitrophenylmethylnitramine		tetryl, 2,4,6-Trinitrophenylmethylnitramine
unavailable12	Radionuclides	uranium, soluble salts		
7440-62-2	Metals	vanadium		
1314-62-1	Metals	vanadium pentoxide		
27774-13-6	Metals	vanadyl sulfate		
1929-77-7	Pesticides	vernam		vernolate
50471-44-8	Pesticides	vinclozolin		Vinclozolin, 2,4-Oxazolidinedione, 3-(3,5-dichlorophenyl)-5-ethenyl-5-methyl-
108-05-4	VOCs	vinyl acetate		
75-01-4	VOCs	VINYL CHLORIDE	VINYL CHLORIDE NOTES	Vinyl Chloride, Chloroethene, Chloroethylene, Ethene, chloro-, Ethylene, chloro-
81-81-2	Pesticides	warfarin		
8012-95-1	Petroleum	white mineral oil		Paraffin oils, Mineral oil
108-38-3	VOCs	xylene;m-		m-Xylene, Benzene, 1,3-dimethyl-
95-47-6	VOCs	xylene;o-		o-Xylene, Benzene, 1,2-dimethyl-
106-42-3	VOCs	xylene;p-		p-Xylene, Benzene, 1,4-dimethyl-
1330-20-7	VOCs	xylenes		Total Xylenes, Benzene, dimethyl-, Xylenes, Xylenes (mixture of o, m, and p isomers)
7440-66-6	Metals	ZINC	HARDNESS - DEPENDENT	
557-21-1	Cyanides	zinc cyanide		
1314-84-7	Metals	zinc phosphide		
12122-67-7	Pesticides	zineb		Zineb, Zinc, [[2-[(dithiocarboxy)amino] ethyl]carbamodithioato(2-)-. kappa.S,.kappa.S']-

	CAS	Data Group	Chemical
1	50-32-8	cPAH	Benzo(a)pyrene
2	19408-74-3	Dioxins/Furans	1,2,3,7,8,9-HxCDD
3	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD
4	132-64-9	Dioxins/Furans	Dibenzofuran
5	93-76-5	Herbicides	2,4,5-T
6	94-75-7	Herbicides	2,4-D
7	94-82-6	Herbicides	2,4-DB
8	75-99-0	Herbicides	Dalapon
9	1918-00-9	Herbicides	Dicamba
10	87-86-5	Herbicides	Pentachlorophenol
11	93-72-1	Herbicides	Silvex
12	7440-36-0	Metals	Antimony
13	7440-38-2	Metals	Arsenic
14	7440-43-9a	Metals	Cadmium
15	16065-83-1	Metals	Chromium III
16	18540-29-9	Metals	Chromium VI
17	7440-50-8	Metals	Copper
18	7439-92-1	Metals	Lead
19	7439-97-6	Metals	Mercury
20	22967-92-6	Metals	Methyl Mercury
21	7440-02-0	Metals	Nickel
22	7782-49-2	Metals	Selenium
23	7440-22-4	Metals	Silver
24	7440-66-6	Metals	Zinc
25	688-73-3	Organotins	Tributyltin
26	56-35-9	Organotins	Tributyltin oxide
27	91-57-6	PAH	2-Methylnaphthalene
28	83-32-9	PAH	Acenaphthene
29	208-96-8	PAH	Acenaphthylene
30	120-12-7	PAH	Anthracene
31	191-24-2	PAH	Benzo(ghi)perylene
32	206-44-0	PAH	Fluoranthene
33	86-73-7	PAH	Fluorene
34	91-20-3	PAH	Naphthalene
35	85-01-8	PAH	Phenanthrene
36	129-00-0	PAH	Pyrene
37	1336-36-3	PCB	Total PCBs
38	959-98-8	Pesticides	.alpha.-Endosulfan
39	33213-65-9	Pesticides	.beta.-Endosulfan
40	72-54-8	Pesticides	4,4'-DDD
41	72-55-9	Pesticides	4,4'-DDE

42	50-29-3	Pesticides	4,4'-DDT
43	309-00-2	Pesticides	Aldrin
44	319-84-6	Pesticides	alpha-BHC
45	319-85-7	Pesticides	beta-BHC
46	319-86-8	Pesticides	delta-BHC
47	60-57-1	Pesticides	Dieldrin
48	1031-07-8	Pesticides	Endosulfan Sulfate
49	72-20-8	Pesticides	Endrin
50	7421-93-4	Pesticides	Endrin Aldehyde
51	76-44-8	Pesticides	Heptachlor
52	1024-57-3	Pesticides	Heptachlor Epoxide
53	118-74-1	Pesticides	Hexachlorobenzene
54	58-89-9	Pesticides	Lindane
55	72-43-5	Pesticides	Methoxychlor
56	12789-03-6	Pesticides	Total Chlordane
57	8001-35-2	Pesticides	Toxaphene
58	58-90-2	Phenols	2,3,4,6-Tetrachlorophenol
59	95-95-4	Phenols	2,4,5-Trichlorophenol
60	88-06-2	Phenols	2,4,6-Trichlorophenol
61	120-83-2	Phenols	2,4-Dichlorophenol
62	105-67-9	Phenols	2,4-Dimethylphenol
63	95-48-7	Phenols	o-Cresol
64	106-44-5	Phenols	p-Cresol
65	108-95-2	Phenols	Phenol
66	117-81-7	Phthalates	Bis(2-ethylhexyl)phthalate
67	85-68-7	Phthalates	Butyl benzyl phthalate
68	84-74-2	Phthalates	Dibutyl phthalate
69	84-66-2	Phthalates	Diethyl phthalate
70	131-11-3	Phthalates	Dimethyl phthalate
71	117-84-0	Phthalates	Di-n-octyl phthalate
72	65-85-0	SVOC	Benzoic Acid
73	100-51-6	SVOC	Benzyl Alcohol
74	62-75-9	SVOC	N-Nitrosodimethylamine
75	86-30-6	SVOC	N-Nitrosodiphenylamine
76	120-82-1	VOC	1,2,4-Trichlorobenzene
77	95-50-1	VOC	1,2-Dichlorobenzene
78	106-46-7	VOC	1,4-Dichlorobenzene
	71-43-2	VOC	Benzene
79	87-68-3	VOC	Hexachlorobutadiene

Notes:

(1) Toxicity data taken from the CLARC table (updated 2019)

(2) Calculated by multiplying the RfDo by the GI absorption conversion factor.

(3) Calculated by dividing the CPFo by the GI absorption conversion factor.

(4) GI absorption factor = if the chemical-specific GI absorption is >50%, use 100% as a d

(5) ABS = In the absence of chemical-specific values, use defaults of 0 percent for inorgar

(6) This considers relative bioavailability. The MTCA default is 1. May use 0.6 for mixtur
(7) Cancer causing chemicals that operate by a mutagenic mode of action as recommenc

cPAH mixtures are evaluated as a group using TEFs. For mixtures of cPAHs, the referenc

cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbon
CPF = Cancer Potency Factor
GI = Gastrointestinal
M = Mutagenic compound
NTV = Not Toxicity Value
PAH = Polycyclic Aromatic Hydrocarbon
RfD = Reference Dose
SVOC = Semi-volatile organic compound
TEF = Toxicity equivalency factor
VOC = Volatile organic compound

References for Toxicity Data

Toxicity data were taken from the December 2017 CLARC Database

A	Agency for Toxic Substances and Disease Registry
H	Health Effects Assessment Summary Table from EPA
I	IRIS (Integrated Risk Information System) database from the Environmen
P	Provisional Peer-Reviewed Toxicity Values from EPA
X	PPRTV Appendix from EPA
C	Cal EPA = California Environmental Protection Agency

RAGS Part E. EPA, 2004. Risk Assessment Guidance for Superfund, Vol. I: Human Healtl

Noncancer Toxicity Values (1)			Cancer Toxicity Values (1)			GI Absorption Conversion Factor (4)
Oral RfD (RfDo)		Dermal RfD (RfDd) (2)	Oral CPF (CPFo)		Dermal CPF (CPFd) (3)	
(mg/kg-day)	Ref.	(mg/kg-day)	(mg/kg-day)$^{-1}$	Ref.	(mg/kg-day)$^{-1}$	
3.00E-04	I	3.0E-04	1E+00	I	1	1
NTV		---	6E+03	I	6200	1
7.00E-10	I	7.0E-10	1E+05	C	130000	1
1.00E-03	X	1.0E-03	NTV		---	1
1.00E-02	I	1.0E-02	NTV		---	1
1.00E-02	I	1.0E-02	NTV		---	1
8.00E-03	I	8.0E-03	NTV		---	1
3.00E-02	I	3.0E-02	NTV		---	1
3.00E-02	I	3.0E-02	NTV		---	1
5.00E-03	I	5.0E-03	4E-01	I	0.4	1
8.00E-03	I	8.0E-03	NTV		---	1
4.00E-04	I	6.0E-05	NTV		---	0.15
3.00E-04	I	3.0E-04	2E+00	I	1.5	1
1.00E-03	I	2.5E-05	NTV		---	0.025
1.50E+00	I	2.0E-02	NTV		---	0.013
3.00E-03	I	7.5E-05	NTV		---	0.025
4.00E-02	H	4.0E-02	NTV		---	1
NTV		---	NTV		---	1
NTV		---	NTV		---	1
1.00E-04		1.0E-04	NTV		---	1
2.00E-02	I	4.0E-03	NTV		---	0.2
5.00E-03	I	5.0E-03	NTV		---	1
5.00E-03	I	2.0E-04	NTV		---	0.04
3.00E-01	I	3.0E-01	NTV		---	1
NTV		---	NTV		---	1
3.00E-04		3.0E-04	NTV		---	1
4.00E-03	I	4.0E-03	NTV		---	1
6.00E-02	I	6.0E-02	NTV		---	1
NTV		---	NTV		---	1
3.00E-01	I	3.0E-01	NTV		---	1
NTV		---	NTV		---	1
4.00E-02	I	4.0E-02	NTV		---	1
4.00E-02	I	4.0E-02	NTV		---	1
2.00E-02	I	2.0E-02	NTV		---	1
NTV		---	NTV		---	1
3.00E-02	I	3.0E-02	NTV		---	1
2.00E-05	I	2.0E-05	2E+00	I	2	1
NTV		---	NTV		---	1
NTV		---	NTV		---	1
3.00E-05	X	3.0E-05	2E-01	I	0.24	1
3.00E-04	X	3.0E-04	3E-01	I	0.34	1

5.00E-04	I	5.0E-04	3E-01	I	0.34	1
3.00E-05	I	3.0E-05	2E+01	I	17	1
8.00E-03	A	8.0E-03	6E+00	I	6.3	1
NTV		---	2E+00	I	1.8	1
NTV		---	NTV		---	1
5.00E-05	I	5.0E-05	2E+01	I	16	1
6.00E-03	P	6.0E-03	NTV		---	1
3.00E-04	I	3.0E-04	NTV		---	1
NTV		---	NTV		---	1
5.00E-04	I	5.0E-04	5E+00	I	4.5	1
1.30E-05	I	1.3E-05	9E+00	I	9.1	1
8.00E-04	I	8.0E-04	2E+00	I	1.6	1
3.00E-04	I	3.0E-04	1E+00	C	1.1	1
5.00E-03	I	5.0E-03	NTV		---	1
5.00E-04	I	5.0E-04	3.5E-01	I	0.35	1
9.00E-05	P	9.0E-05	1.1E+00	I	1.1	1
3.00E-02	I	3.0E-02	NTV		---	1
1.00E-01	I	1.0E-01	NTV		---	1
1.00E-03	P	1.0E-03	1E-02	I	0.011	1
3.00E-03	I	3.0E-03	NTV		---	1
2.00E-02	I	2.0E-02	NTV		---	1
5.00E-02	I	5.0E-02	NTV		---	1
1.00E-01	A	1.0E-01	NTV		---	1
3.00E-01	I	3.0E-01	NTV		---	1
2.00E-02	I	2.0E-02	1E-02	I	0.014	1
2.00E-01	I	2.0E-01	2E-03	P	0.0019	1
1.00E-01	I	1.0E-01	NTV		---	1
8.00E-01	I	8.0E-01	NTV		---	1
NTV		---	NTV		---	1
1.00E-02	P	1.0E-02	NTV		---	1
4.00E+00	I	4.0E+00	NTV		---	1
1.00E-01	P	1.0E-01	NTV		---	1
8.00E-06	P	8.0E-06	5E+01	I	51	1
NTV		---	5E-03	I	0.0049	1
1.00E-02	I	1.0E-02	3E-02	P	0.029	1
9.00E-02	I	9.0E-02	NTV		---	1
7.00E-02	A	7.0E-02	5E-03	C	0.0054	1
4.00E-03	I	4.0E-03	5.5E-02	I	0.055	1
0.001	P	1.0E-03	7.8E-02	I	0.078	1

efault; use 100% as a default for inorganics, VOCs, and SVOCs that lack chemical-specific values (EPA R
nics and VOCs, and 10 percent for SVOCs (EPA RAGS Part E, 2004).

Dermal absorption factor (ABS) (5)	Gastrointestinal absorption factor (AB) (6)	Mutagen (7)
0.13	1	M
0.03	1	
0.03	0.6	
0.03	1	
0.1	1	
0.05	1	
0.1	1	
0.1	1	
0.1	1	
0.25	1	
0.1	1	
0	1	
0.03	1	
0.001	1	
0	1	
0	1	
0	1	
0	1	
0	1	
0	1	
0.01	1	
0	1	
0	1	
0	1	
0	1	
0.1	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.13	1	
0.14	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	

Toxicity data for total PCBs are based on the highest CPF

0.03	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.04	1	
0.1	1	
0.04	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0.1	1	
0	1	
0	1	
0	1	
0	1	
0	1	

AGS Part E, 2004)

or lowest RfD among the PCB aroclors.

Human Health Direct Contact Sediment
Separately for Child Beac
N

Non-Carcinogenic

Sediment Cleanup Level (mg/kg dry wt) =

Noncancer - Direct Contact

Adult Sub
Adult S

	CAS	Data Group	Chemical
1	50-32-8	cPAH	Benzo(a)pyrene
2	19408-74-3	Dioxins/Furans	1,2,3,7,8,9-HxCDD
3	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD
4	132-64-9	Dioxins/Furans	Dibenzofuran
5	93-76-5	Herbicides	2,4,5-T
6	94-75-7	Herbicides	2,4-D
7	94-82-6	Herbicides	2,4-DB
8	75-99-0	Herbicides	Dalapon
9	1918-00-9	Herbicides	Dicamba

10	87-86-5	Herbicides	Pentachlorophenol
11	93-72-1	Herbicides	Silvex
12	7440-36-0	Metals	Antimony
13	7440-38-2	Metals	Arsenic
14	7440-43-9a	Metals	Cadmium
15	16065-83-1	Metals	Chromium III
16	18540-29-9	Metals	Chromium VI
17	7440-50-8	Metals	Copper
18	7439-92-1	Metals	Lead
19	7439-97-6	Metals	Mercury
20	22967-92-6	Metals	Methyl Mercury
21	7440-02-0	Metals	Nickel
22	7782-49-2	Metals	Selenium
23	7440-22-4	Metals	Silver
24	7440-66-6	Metals	Zinc
25	688-73-3	Organotins	Tributyltin
26	56-35-9	Organotins	Tributyltin oxide
27	91-57-6	PAH	2-Methylnaphthalene
28	83-32-9	PAH	Acenaphthene
29	208-96-8	PAH	Acenaphthylene
30	120-12-7	PAH	Anthracene
31	191-24-2	PAH	Benzo(ghi)perylene
32	206-44-0	PAH	Fluoranthene
33	86-73-7	PAH	Fluorene
34	91-20-3	PAH	Naphthalene
35	85-01-8	PAH	Phenanthrene
36	129-00-0	PAH	Pyrene
37	1336-36-3	PCB	Total PCBs
38	959-98-8	Pesticides	.alpha.-Endosulfan
39	33213-65-9	Pesticides	.beta.-Endosulfan
40	72-54-8	Pesticides	4,4'-DDD
41	72-55-9	Pesticides	4,4'-DDE
42	50-29-3	Pesticides	4,4'-DDT
43	309-00-2	Pesticides	Aldrin
44	319-84-6	Pesticides	alpha-BHC
45	319-85-7	Pesticides	beta-BHC
46	319-86-8	Pesticides	delta-BHC
47	60-57-1	Pesticides	Dieldrin
48	1031-07-8	Pesticides	Endosulfan Sulfate
49	72-20-8	Pesticides	Endrin
50	7421-93-4	Pesticides	Endrin Aldehyde
51	76-44-8	Pesticides	Heptachlor
52	1024-57-3	Pesticides	Heptachlor Epoxide
53	118-74-1	Pesticides	Hexachlorobenzene
54	58-89-9	Pesticides	Lindane
55	72-43-5	Pesticides	Methoxychlor
56	12789-03-6	Pesticides	Total Chlordane

57	8001-35-2	Pesticides	Toxaphene
58	58-90-2	Phenols	2,3,4,6-Tetrachlorophenol
59	95-95-4	Phenols	2,4,5-Trichlorophenol
60	88-06-2	Phenols	2,4,6-Trichlorophenol
61	120-83-2	Phenols	2,4-Dichlorophenol
62	105-67-9	Phenols	2,4-Dimethylphenol
63	95-48-7	Phenols	o-Cresol
64	106-44-5	Phenols	p-Cresol
65	108-95-2	Phenols	Phenol
66	117-81-7	Phthalates	Bis(2-ethylhexyl)phthalate
67	85-68-7	Phthalates	Butyl benzyl phthalate
68	84-74-2	Phthalates	Dibutyl phthalate
69	84-66-2	Phthalates	Diethyl phthalate
70	131-11-3	Phthalates	Dimethyl phthalate
71	117-84-0	Phthalates	Di-n-octyl phthalate
72	65-85-0	SVOC	Benzoic Acid
73	100-51-6	SVOC	Benzyl Alcohol
74	62-75-9	SVOC	N-Nitrosodimethylamine
75	86-30-6	SVOC	N-Nitrosodiphenylamine
76	120-82-1	VOC	1,2,4-Trichlorobenzene
77	95-50-1	VOC	1,2-Dichlorobenzene
78	106-46-7	VOC	1,4-Dichlorobenzene
	71-43-2	VOC	Benzene
79	87-68-3	VOC	Hexachlorobutadiene

Cleanup Levels (Combined Ingestion and Dermal Contact)
h Play, Adult Clam Digger, Adult Net Fisher
oncancer Endpoint

Formula (Equation 9-2 SCUM II Manual)

$$\frac{HQ \times BW \times ATnc \times UCF}{ED \times ED \times [((1/RfDo) \times IR \times AB) + ((1/RfDd) \times SA \times AF \times ABS)]}$$

Oral Reference Dose (RfDo) (mg/kg-day) = Chemical Specific
Dermal Reference Dose (RfDd) (mg/kg-day) = Chemical Specific
Hazard Quotient (HQ) (unitless) = 1
Child Body weight (BW) (kg) = 15.2
Adult Body weight (BW) (kg) = 81
Child Noncancer Averaging Time (ATnc) (days) = 2190
Adult Noncancer Averaging Time (ATnc) (days) = 25550
Child Beach Play Exposure Frequency (EF) (days/years) = 41
Adult Subsistence Clam Digger Exposure Frequency (EF) (days/years) = 120
Adult Subsistence Net Fisher Exposure Frequency (EF) (days/years) = 119
Child Exposure duration (ED) (years) = 6
Adult Exposure duration (ED) (years) = 70
Child Beach Play Ingestion rate (IR) (mg/day) = 200
Adult Subsistence Clam Digger Ingestion rate (IR) (mg/day) = 100
Adult Subsistence Net Fisher Ingestion rate (IR) (mg/day) = 50
Gastrointestinal absorption factor (AB) (unitless) = Chemical Specific
Unit conversion factor (UCF) (mg/kg) = 1.00E+06
Child dermal surface area (SA) (cm^2) = 2378
Adult dermal surface area (SA) (cm^2) = 3470
Child Beach Play Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.2
sistence Clam Digger Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.6
ubsistence Net Fisher Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.02
Dermal absorption factor (ABS) (unitless) = Chemical Specific

Child Beach Play mg/kg	Adult Clam Digger mg/kg	Adult Net Fisher mg/kg
1.55E+02	1.99E+02	1.26E+03
NTV	NTV	NTV
7.05E-04	1.41E-03	5.42E-03
6.32E+02	1.52E+03	4.77E+03
5.47E+03	7.99E+03	4.36E+04
6.05E+03	1.21E+04	4.65E+04
4.37E+03	6.40E+03	3.49E+04
1.64E+04	2.40E+04	1.31E+05
1.64E+04	2.40E+04	1.31E+05

2.12E+03	1.99E+03	1.84E+04
4.37E+03	6.40E+03	3.49E+04
2.71E+02	9.86E+02	1.99E+03
1.89E+02	4.55E+02	1.43E+03
6.18E+02	1.34E+03	4.71E+03
1.01E+06	3.70E+06	7.45E+06
2.03E+03	7.39E+03	1.49E+04
2.71E+04	9.86E+04	1.99E+05
NTV	NTV	NTV
NTV	NTV	NTV
6.77E+01	2.46E+02	4.97E+02
1.21E+04	2.41E+04	9.29E+04
3.38E+03	1.23E+04	2.48E+04
3.38E+03	1.23E+04	2.48E+04
2.03E+05	7.39E+05	1.49E+06
NTV	NTV	NTV
1.64E+02	2.40E+02	1.31E+03
2.07E+03	2.66E+03	1.68E+04
3.10E+04	3.99E+04	2.53E+05
NTV	NTV	NTV
1.55E+05	1.99E+05	1.26E+06
NTV	NTV	NTV
2.07E+04	2.66E+04	1.68E+05
2.07E+04	2.66E+04	1.68E+05
1.03E+04	1.33E+04	8.42E+04
NTV	NTV	NTV
1.55E+04	1.99E+04	1.26E+05
1.02E+01	1.26E+01	8.32E+01
NTV	NTV	NTV
NTV	NTV	NTV
1.64E+01	2.40E+01	1.31E+02
1.64E+02	2.40E+02	1.31E+03
3.16E+02	7.58E+02	2.39E+03
1.64E+01	2.40E+01	1.31E+02
4.37E+03	6.40E+03	3.49E+04
NTV	NTV	NTV
NTV	NTV	NTV
2.73E+01	4.00E+01	2.18E+02
3.28E+03	4.80E+03	2.62E+04
1.64E+02	2.40E+02	1.31E+03
NTV	NTV	NTV
2.73E+02	4.00E+02	2.18E+03
7.11E+00	1.04E+01	5.67E+01
4.37E+02	6.40E+02	3.49E+03
1.85E+02	4.03E+02	1.41E+03
2.73E+03	4.00E+03	2.18E+04
3.09E+02	6.72E+02	2.35E+03

4.92E+01	7.19E+01	3.93E+02
1.64E+04	2.40E+04	1.31E+05
5.47E+04	7.99E+04	4.36E+05
5.47E+02	7.99E+02	4.36E+03
1.64E+03	2.40E+03	1.31E+04
1.09E+04	1.60E+04	8.73E+04
2.73E+04	4.00E+04	2.18E+05
5.47E+04	7.99E+04	4.36E+05
1.64E+05	2.40E+05	1.31E+06
1.09E+04	1.60E+04	8.73E+04
1.09E+05	1.60E+05	8.73E+05
5.47E+04	7.99E+04	4.36E+05
4.37E+05	6.40E+05	3.49E+06
NTV	NTV	NTV
5.47E+03	7.99E+03	4.36E+04
2.19E+06	3.20E+06	1.75E+07
5.47E+04	7.99E+04	4.36E+05
4.37E+00	6.40E+00	3.49E+01
NTV	NTV	NTV
6.77E+03	2.46E+04	4.97E+04
6.09E+04	2.22E+05	4.47E+05
4.74E+04	1.72E+05	3.48E+05
2.71E+03	9.86E+03	1.99E+04
6.77E+02	2.46E+03	4.97E+03

Human Health Direct Contact Sediment Cleanup Level (Combined Ingestion and Dermal Contact)

Separately for Child Beach Play, Adult Clam Digger, Adult Net Fisher

Cancer Endpoint

Carcinogenic Formula (Equation 9-1 SCUM II Manual)

$$\text{Sediment Cleanup Level (mg/kg dry wt)} = \frac{\text{ACR x BW x ATcr x UCF}}{\text{ED x EF x [(IR x AB x CPFo) + (SA x AF x ABS x CPFd)]}}$$

Cancer - Direct Contact

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Dermal Carcinogenic Potency Factor (CPFd) (kg-day/mg) = Chemical Specific
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Child Body weight (BW) (kg) = 15.2
Adult Body weight (BW) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Child Beach Play Exposure Frequency (EF) (days/years) = 41
Adult Subsistence Clam Digger Exposure Frequency (EF) (days/years) = 120
Adult Subsistence Net Fisher Exposure Frequency (EF) (days/years) = 119
Child Exposure duration (ED) (years) = 6
Adult Exposure duration (ED) (years) = 70
Child Beach Play Ingestion rate (IR) (mg/day) = 200
Adult Subsistence Clam Digger Ingestion rate (IR) (mg/day) = 100
Adult Subsistence Net Fisher Ingestion rate (IR) (mg/day) = 50
Gastrointestinal absorption factor (AB) (unitless) = Chemical Specific
Unit conversion factor (UCF) (mg/kg) = 1.00E+06
Child dermal surface area (SA) (cm^2) = 2378
Adult dermal surface area (SA) (cm^2) = 3470
Child Beach Play Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.2
Adult Subsistence Clam Digger Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.6
Adult Subsistence Net Fisher Sediment-to-skin adherence factor (AF) (mg/cm^2-day) = 0.02
Dermal absorption factor (ABS) (unitless) = Chemical Specific

CAS	Data Group	Chemical	Child Beach Play mg/kg	Adult Clam Digger mg/kg	Adult Net Fisher mg/kg
50-32-8	cPAH	Benzo(a)pyrene	6.03E+00	6.65E-01	4.21E+00

Human Health Direct Contact Sediment Cleanup Level (Combined Ingestion and Dermal Contact)
Cancer - Mutagenic (Child Beach Play)

Carcinogenic Formula (Equation 9-1 SCUM II Manual - modified to include early life exposure)

Sediment Cleanup Level (mg/kg dry wt) =

$$\frac{ACR \times ATcr \times UCF}{(CPFo \times AB \times IRF_{child\text{-}adj}) + (CPFd \times ABS \times DF_{child\text{-}adj})}$$

Where:

$$IRF_{child\text{-}adj} = (IR_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (IR_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$

$$DF_{child\text{-}adj} = (SA_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times AF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (SA_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times AF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$

Cancer - Mutagenic (Child Beach Play)

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Dermal Carcinogenic Potency Factor (CPFd) (kg-day/mg) = Chemical Specific
Child Mutagenic Sediment Ingestion Factor - Age-adjusted ($IRF_{child\text{-}adj}$) (mg/kg) = 24299.77117
Child Mutagenic Sediment Dermal Factor - Age-adjusted ($DF_{child\text{-}adj}$) (mg/kg) = 51569.83753
Age-Dependent Adjustment Factor - 0 - 2 years old ($ADAF_{0\text{-}2}$) = 10
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{2\text{-}6}$) = 3
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Child Body weight ($BW_{0\text{-}2}$) (kg) = 9.2
Child Body weight ($BW_{2\text{-}6}$) (kg) = 15.2
Cancer Averaging Time (ATcr) (days) = 25550
Child Beach Play Exposure Frequency ($EF_{0\text{-}2}$) (days/years) = 41
Child Beach Play Exposure Frequency ($EF_{2\text{-}6}$) (days/years) = 41
Child Exposure duration ($ED_{0\text{-}2}$) (years) = 2
Child Exposure duration ($ED_{2\text{-}6}$) (years) = 4
Child Beach Play Ingestion rate ($IR_{0\text{-}2}$) (mg/day) = 200
Child Beach Play Ingestion rate ($IR_{2\text{-}6}$) (mg/day) = 200
Gastrointestinal absorption factor (AB) (unitless) = Chemical Specific
Unit conversion factor (UCF) (mg/kg) = 1.00E+06
Child dermal surface area ($SA_{0\text{-}2}$) (cm^2) = 1952
Child dermal surface area ($SA_{2\text{-}6}$) (cm^2) = 2591
Child Beach Play Sediment-to-skin adherence factor ($AF_{0\text{-}2}$) (mg/cm^2-day) = 0.2
Child Beach Play Sediment-to-skin adherence factor ($AF_{2\text{-}6}$) (mg/cm^2-day) = 0.2
Dermal absorption factor (ABS) (unitless) = Chemical Specific

CAS	Data Group	Chemical	Child Beach Play mg/kg
50-32-8	cPAH	Benzo(a)pyrene	8.2E-01

Human Health Direct Contact Sediment Cleanup Level (Combined Ingestion and Dermal Contact)

Cancer Mutagenic - Child/Adult (Child Beach Play and Adult Clamming)

Carcinogenic Formula (Equation 9-1 SCUM II Manual - modified to include early life exposure)

$$\text{Sediment Cleanup Level (mg/kg dry wt)} = \frac{ACR \times ATcr \times UCF}{(CPFo \times AB \times IRF_{adj}) + (CPFd \times ABS \times DF_{adj})}$$

Where:

$$IRF_{adj} = (IR_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (IR_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$
$$(IR_{6\text{-}16} \times ED_{6\text{-}16} \times EF_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (IR_{16\text{-}70} \times ED_{16\text{-}70} \times EF_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$$

$$DF_{adj} = (SA_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times AF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (SA_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times AF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$
$$(SA_{6\text{-}16} \times ED_{6\text{-}16} \times EF_{6\text{-}16} \times AF_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (SA_{16\text{-}70} \times ED_{16\text{-}70} \times EF_{16\text{-}70} \times AF_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$$

Cancer - Mutagenic
Beach Play and Clam Digging

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Dermal Carcinogenic Potency Factor (CPFd) (kg-day/mg) = Chemical Specific
Mutagenic Sediment Ingestion Factor - Age-adjusted (IRF_{adj}) (mg/kg) = 40426.182
Mutagenic Sediment Dermal Factor - Age-adjusted (DF_{adj}) (mg/kg) = 320472.8804
Age-Dependent Adjustment Factor - 0 - 2 years old ($ADAF_{0\text{-}2}$) = 10
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{2\text{-}6}$) = 3
Age-Dependent Adjustment Factor - 6 - 16 years old ($ADAF_{6\text{-}16}$) = 3
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{16\text{-}70}$) = 1
Acceptable cancer risk level (ACR) (1 in 1,000,000) unitless = 1.00E-06
Body weight ($BW_{0\text{-}2}$) (kg) = 9.2
Body weight ($BW_{2\text{-}6}$) (kg) = 15.2
Body weight ($BW_{6\text{-}16}$) (kg) = 44.3
Body weight ($BW_{16\text{-}70}$) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency ($EF_{0\text{-}2}$) (days/years) = 41
Exposure Frequency ($EF_{2\text{-}6}$) (days/years) = 41
Exposure Frequency ($EF_{6\text{-}16}$) (days/years) = 120
Exposure Frequency ($EF_{16\text{-}64}$) (days/years) = 120
Exposure duration ($ED_{0\text{-}2}$) (years) = 2
Exposure duration ($ED_{2\text{-}6}$) (years) = 4
Exposure duration ($ED_{6\text{-}16}$) (years) = 10
Exposure duration ($ED_{16\text{-}70}$) (years) = 54
Ingestion rate ($IR_{0\text{-}2}$) (mg/day) = 200
Ingestion rate ($IR_{2\text{-}6}$) (mg/day) = 200
Ingestion rate ($IR_{6\text{-}16}$) (mg/day) = 100
Ingestion rate ($IR_{16\text{-}64}$) (mg/day) = 100
Gastrointestinal absorption factor (AB) (unitless) = Chemical Specific
Unit conversion factor (UCF) (mg/kg) = 1.00E+06
Dermal surface area ($SA_{0\text{-}2}$) (cm^2) = 1952
Dermal surface area ($SA_{2\text{-}6}$) (cm^2) = 2591
Dermal surface area ($SA_{6\text{-}16}$) (cm^2) = 2161
Dermal surface area ($SA_{16\text{-}70}$) (cm^2) = 3407
Sediment-to-skin adherence factor ($AF_{0\text{-}2}$) (mg/cm^2-day) = 0.2
Sediment-to-skin adherence factor ($AF_{2\text{-}6}$) (mg/cm^2-day) = 0.2
Sediment-to-skin adherence factor ($AF_{6\text{-}16}$) (mg/cm^2-day) = 0.6
Sediment-to-skin adherence factor ($AF_{16\text{-}70}$) (mg/cm^2-day) = 0.6
Dermal absorption factor (ABS) (unitless) = Chemical Specific

CAS	Data Group	Chemical	Child Beach Play/Adult Clamming mg/kg
50-32-8	cPAH	Benzo(a)pyrene	3.1E-01

Human Health Direct Contact Sediment Cleanup Level (Combined Ingestion and Dermal Contact)
Cancer Mutagenic - Child/Adult (Child Beach Play and Adult Net Fishing)

Carcinogenic Formula (Equation 9-1 SCUM II Manual - modified to include early life exposure)

$$\text{Sediment Cleanup Level (mg/kg dry wt)} = \frac{ACR \times ATcr \times UCF}{(CPFo \times AB \times IRF_{adj}) + (CPFd \times ABS \times DF_{adj})}$$

Where:

$$IRF_{adj} = (IR_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (IR_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$
$$(IR_{6\text{-}16} \times ED_{6\text{-}16} \times EF_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (IR_{16\text{-}70} \times ED_{16\text{-}70} \times EF_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$$

$$DF_{adj} = (SA_{0\text{-}2} \times ED_{0\text{-}2} \times EF_{0\text{-}2} \times AF_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (SA_{2\text{-}6} \times ED_{2\text{-}6} \times EF_{2\text{-}6} \times AF_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6})$$
$$(SA_{6\text{-}16} \times ED_{6\text{-}16} \times EF_{6\text{-}16} \times AF_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (SA_{16\text{-}70} \times ED_{16\text{-}70} \times EF_{16\text{-}70} \times AF_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$$

Cancer - Mutagenic
Beach Play and Net Fishing

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Dermal Carcinogenic Potency Factor (CPFd) (kg-day/mg) = Chemical Specific
Mutagenic Sediment Ingestion Factor - Age-adjusted (IRF_{adj}) (mg/kg) = 32295.78321
Mutagenic Sediment Dermal Factor - Age-adjusted (DF_{adj}) (mg/kg) = 60458.577
Age-Dependent Adjustment Factor - 0 - 2 years old ($ADAF_{0\text{-}2}$) = 10
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{2\text{-}6}$) = 3
Age-Dependent Adjustment Factor - 6 - 16 years old ($ADAF_{6\text{-}16}$) = 3
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{16\text{-}70}$) = 1
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Body weight ($BW_{0\text{-}2}$) (kg) = 9.2
Body weight ($BW_{2\text{-}6}$) (kg) = 15.2
Body weight ($BW_{6\text{-}16}$) (kg) = 44.3
Body weight ($BW_{16\text{-}70}$) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency ($EF_{0\text{-}2}$) (days/years) = 41
Exposure Frequency ($EF_{2\text{-}6}$) (days/years) = 41
Exposure Frequency ($EF_{6\text{-}16}$) (days/years) = 119
Exposure Frequency ($EF_{16\text{-}64}$) (days/years) = 119
Exposure duration ($ED_{0\text{-}2}$) (years) = 2
Exposure duration ($ED_{2\text{-}6}$) (years) = 4
Exposure duration ($ED_{6\text{-}16}$) (years) = 10
Exposure duration ($ED_{16\text{-}70}$) (years) = 54
Ingestion rate ($IR_{0\text{-}2}$) (mg/day) = 200
Ingestion rate ($IR_{2\text{-}6}$) (mg/day) = 200
Ingestion rate ($IR_{6\text{-}16}$) (mg/day) = 50
Ingestion rate ($IR_{16\text{-}64}$) (mg/day) = 50
Gastrointestinal absorption factor (AB) (unitless) = Chemical Specific
Unit conversion factor (UCF) (mg/kg) = 1.00E+06
Dermal surface area ($SA_{0\text{-}2}$) (cm^2) = 1952
Dermal surface area ($SA_{2\text{-}6}$) (cm^2) = 2591
Dermal surface area ($SA_{6\text{-}16}$) (cm^2) = 2161
Dermal surface area ($SA_{16\text{-}70}$) (cm^2) = 3407
Sediment-to-skin adherence factor ($AF_{0\text{-}2}$) (mg/cm^2-day) = 0.2
Sediment-to-skin adherence factor ($AF_{2\text{-}6}$) (mg/cm^2-day) = 0.2
Sediment-to-skin adherence factor ($AF_{6\text{-}16}$) (mg/cm^2-day) = 0.02
Sediment-to-skin adherence factor ($AF_{16\text{-}70}$) (mg/cm^2-day) = 0.02
Dermal absorption factor (ABS) (unitless) = Chemical Specific

CAS	Data Group	Chemical	Child Beach Play/Adult Net Fishing mg/kg
50-32-8	cPAH	Benzo(a)pyrene	6.4E-01

				Noncancer Toxicity Values (1)		Cancer Toxicity Values (1)					
				Oral RfD (RfDo)		Oral CPF (CPFo)					
	CAS	Data Group	Chemical	(mg/kg-day)	Ref.	$(mg/kg\text{-}day)^{-1}$	Ref.	S_{foc}	f_{lipid}	BSAF	Mutagen (2)
1	50-32-8	cPAH	Benzo(a)pyrene	3.00E-04	I	1.0E+00	I	0.0223	0.0051	0.67	M
2	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD	7.00E-10	I	1.3E+05	C	0.0223	0.0051	0.06	
3	1336-36-3	PCB	Total PCBs	2.00E-05	I	2E+00	I	0.0223	0.0051	0.032	
4	1746-01-6a	PCB	Dioxin-like PCB TEQs	7.00E-10	I	1.3E+05	C	0.0223	0.0051	0.01	
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

Notes:

(1) Toxicity data taken from the CLARC table (updated 2019)

(2) Cancer causing chemicals that operate by a mutagenic mode of action are identified with an "M".

cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbon
CPF = Cancer Potency Factor
M = Mutagenic compound
NTV = Not Toxicity Value
PAH = Polycyclic Aromatic Hydrocarbon
RfD = Reference Dose
TEF = Toxicity equivalency factor

<u>References for Toxicity Data</u>

I	IRIS (Integrated Risk Information System) database from the Environmental Protection Agency (EPA)
C	Cal EPA = California Environmental Protection Agency

BSAF, lipip, and foc are based on Jeld-Wen data. Jeld-Wen developed site-specific BSAFs for cPAHs, dioxins/furans, and PCBs.

The BSAF data for metals was populated for calculation purposes and needs to be updated with site-specific data.

Notes:

(1) Toxicity data taken from the December 2017 draft CLARC table.
(2) Calculated by multiplying the RfDo by the GI absorption conversion factor.
(3) Calculated by dividing the CPFo by the GI absorption conversion factor.
(4) GI MTCA Defaults = 0.2 for inorganics; 0.8 for volatile chemicals and mixtures of dioxins/furans; 0.5 for other organic chemicals
(5) ABS MTCA Defaults = 0.01 for inorganics; 0.03 for VOCs w/VP < benzene; 0.0005 for VOCs w/VP ≥ benzene; 0.1 for other organic chemicals. A chemical-specific value of 0.03 was used for dioxins/furans.
(6) This considers relative bioavailability. The MTCA default is 1. May use 0.6 for mixtures of dioxins/furans. These values were imported from CLARC.
(7) Cancer causing chemicals that operate by a mutagenic mode of action are identified with an "M". Identified in EPAs November 2018 Regional Screening Level Table.
cPAH mixtures are evaluated as a group using TEFs. For mixtures of cPAHs, the reference chemical is benzo(a)pyrene.

cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbon
CPF = Cancer Potency Factor
GI = Gastrointestinal
M = Mutagenic compound
NTV = Not Toxicity Value
PAH = Polycyclic Aromatic Hydrocarbon
RfD = Reference Dose
SVOC = Semi-volatile organic compound
TEF = Toxicity equivalency factor
VOC = Volatile organic compound

S_{foc} = Fraction of organic carbon in sediment (unitless) =
SL = lipid content in tissue (unitless) =
BSAF = Biota-Sediment Accumulation Factor (unitless) =

References for Toxicity Data

Toxicity data were taken from the December 2017 CLARC Database

A	Agency for Toxic Substances and Disease Registry
H	Health Effects Assessment Summary Table from EPA
I	IRIS (Integrated Risk Information System) database from the Environmental Protection Agency (EPA)
P	Provisional Peer-Reviewed Toxicity Values from EPA
X	PPRTV Appendix from EPA
C	Cal EPA = California Environmental Protection Agency

Toxicity data for total PCBs are based on the highest CPF or lowest RfD among the PCB aroclors.

Human Health Risk-Based Tissue Concentration - Adult Exposure

Noncancer Effects

Non-Carcinogenic Formula (Equation 9-6 SCUM II Manual)

$$\text{Risk-based Tissue Concentration (mg/kg)} = \frac{HQ \times BW \times ATnc \times UCF \times RfDo}{FCR \times FDF \times EF \times ED}$$

Noncancer - Fish Tissue Consumption
Risk-based Tissue Concentration
Adult Exposure

Oral Reference Dose (RfDo) (mg/kg-day) = Chemical Specific
Hazard Quotient (HQ) (unitless) = 1
Adult Body weight (BW) (kg) = 81
Noncancer Averaging Time (ATnc) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration (ED) (years) = 70
Fish consumption rate (FCR) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

	CAS	Data Group	Chemical	Tissue Concentration mg/kg	Concentrations converted to ppb or ppt		
1	50-32-8	cPAH	Benzo(a)pyrene	1.31E-01	1.31E+02	ug/kg	ppb
2	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD	3.0E-07	3.05E-01	ng/kg	ppt
3	1336-36-3	PCB	Total PCBs	8.7E-03	8.71E+00	ug/kg	ppb
4							

Human Health Risk-Based Tissue Concentration - Adult Exposure
Carcinogenic Effects

Carcinogenic Formula (Equation 9-5 SCUM II Manual)

$$\text{Risk-based Tissue Concentration (mg/kg)} = \frac{ACR \times BW \times ATcr \times UCF}{CPFo \times FCR \times FDF \times EF \times ED}$$

Cancer - Fish Tissue Consumption
Risk-based Tissue Concentration
Adult Exposure

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Adult Body weight (BW) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration (ED) (years) = 70
Fish consumption rate (FCR) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

CAS	Data Group	Chemical	Tissue Concentration mg/kg	Concentrations converted to ppb or ppt		
50-32-8	cPAH	Benzo(a)pyrene	4.4E-04	4.35E-01	ug/kg	ppb

Human Health Risk-Based Tissue Concentration - Child/Adult Exposure
Carcinogenic Effects - Mutagenic

Carcinogenic Formula (Equation 9-5 SCUM II Manual - modified to include early life exposure)

$$\text{Risk-based Tissue Concentration (mg/kg)} = \frac{ACR \times ATcr \times UCF}{IRF_{adj} \times EF \times CPFo \times FDF}$$

Where:

$$IRF_{adj} = (FCR_{0\text{-}2} \times ED_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (FCR_{2\text{-}6} \times ED_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6}) + (FCR_{6\text{-}16} \times ED_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (FCR_{16\text{-}70} \times ED_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$$

Cancer - Fish Tissue Consumption
Risk-based Tissue Concentration
Child/Adult Exposure - Mutagenic

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Mutagenic Tissue Ingestion Factor - Age-adjusted (IRF_{adj}) (g-year/kg-day) = 489.9936929
Age-Dependent Adjustment Factor - 0 - 2 years old ($ADAF_{0\text{-}2}$) = 10
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{2\text{-}6}$) = 3
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{6\text{-}16}$) = 3
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{16\text{-}70}$) = 1
Acceptable cancer risk level (ACR) (1 in 1,000,000) unitless = 1.00E-06
Body weight ($BW_{0\text{-}2}$) (kg) = 9.2
Body weight ($BW_{2\text{-}6}$) (kg) = 15.2
Body weight ($BW_{6\text{-}16}$) (kg) = 44.3
Body weight ($BW_{16\text{-}70}$) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration ($ED_{0\text{-}2}$) (years) = 2
Exposure duration ($ED_{2\text{-}6}$) (years) = 4
Exposure duration ($ED_{6\text{-}16}$) (years) = 10
Exposure duration ($ED_{16\text{-}70}$) (years) = 54
Fish consumption rate ($FCR_{0\text{-}2}$) (g/day) = 81
Fish consumption rate ($FCR_{2\text{-}6}$) (g/day) = 81
Fish consumption rate ($FCR_{6\text{-}16}$) (g/day) = 186
Fish consumption rate ($FCR_{16\text{-}70}$) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

CAS	Data Group	Chemical	Tissue Concentration mg/kg	Concentrations converted to ppb or ppt		
50-32-8	cPAH	Benzo(a)pyrene	1.4E-04	1.43E-01	ug/kg	ppb

Human Health Sediment Cleanup Level for Consumption of Fish - Adult Exposure
Noncancer Effects

Non-Carcinogenic Formula (Equation 9-6 SCUM II Manual - modified to include BSAF)

$$\text{Sediment Cleanup Level (mg/kg)} = \frac{\text{HQ x BW x ATnc x UCF x RfDo x } S_{foc}}{\text{FCR x FDF x EF x ED x } f_{lipid} \text{ x BSAF}}$$

Noncancer - Fish Tissue Consumption
Risk-based Sediment Concentration
Adult Exposure

Oral Reference Dose (RfDo) (mg/kg-day) = Chemical Specific
S_{foc} = Fraction of organic carbon in sediment (unitless) = Site Specific
f_{lipid} = lipid content in tissue (unitless) = Site Specific
BSAF = Biota-Sediment Accumulation Factor (unitless) = Chemical Specific
Hazard Quotient (HQ) (unitless) = 1
Adult Body weight (BW) (kg) = 81
Noncancer Averaging Time (ATnc) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration (ED) (years) = 70
Fish/Shellfish consumption rate (FCR) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

	CAS	Data Group	Chemical	Sediment Concentration mg/kg	Concentrations converted to ppb or ppt		
1	50-32-8	cPAH	Benzo(a)pyrene	8.53E-01	8.53E+02	ug/kg	ppb
2	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD	2.22E-05	2.22E+01	ng/kg	ppt
3	1336-36-3	PCB	Total PCBs	1.19E+00	1.19E+03	ug/kg	ppb

Estimate fish tissue concentration from BSAF

Fish Tissue Concentration =

$$\frac{\text{Sediment Concentration x } f_{lipid} \text{ x BSAF}}{S_{foc}}$$

Human Health Sediment Cleanup Level for Consumption of Fish - Adult Exposure
Carcinogenic Effects

Carcinogenic Formula (Equation 9-5 SCUM II Manual - modified to include BSAF)

$$\text{Sediment Cleanup Level (mg/kg)} = \frac{\text{ACR} \times \text{BW} \times \text{ATcr} \times \text{UCF} \times S_{foc}}{\text{CPFo} \times \text{FCR} \times \text{FDF} \times \text{EF} \times \text{ED} \times f_{lipid} \times \text{BSAF}}$$

Cancer - Fish Tissue Consumption
Risk-based Sediment Concentration
Adult Exposure

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
S_{foc} = Fraction of organic carbon in sediment (unitless) = Site Specific
f_{lipid} = lipid content in tissue (unitless) = Site Specific
BSAF = Biota-Sediment Accumulation Factor (unitless) = Chemical Specific
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Adult Body weight (BW) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration (ED) (years) = 70
Fish/Shellfish consumption rate (FCR) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

	CAS	Data Group	Chemical	Sediment Concentration mg/kg	Concentrations converted to ppb or ppt		
1	50-32-8	cPAH	Benzo(a)pyrene	2.84E-03	2.84E+00	ug/kg	ppb
2	1746-01-6	Dioxins/Furans	2,3,7,8-TCDD	2.44E-07	2.44E-01	ng/kg	ppt
3	1336-36-3	PCB	Total PCBs	2.98E-02	2.98E+01	ug/kg	ppb
	1746-01-6a	PCB	Dioxin-like PCB TEQs	1.46E-06	1.46E+00	ng/kg	ppt

<u>Estimate fish tissue concentration from BSAF</u>

$$\text{Fish Tissue Concentration} = \frac{\text{Sediment Concentration} \times f_{lipid} \times \text{BSAF}}{S_{foc}}$$

Human Health Sediment Cleanup Level for Consumption of Fish - Child/Adult Exposure
Carcinogenic Effects - Mutagenic

Carcinogenic Formula (Equation 9-5 SCUM II Manual - modified to include BSAF)

$$\text{Sediment Cleanup Level (mg/kg)} = \frac{ACR \times ATcr \times UCF \times S_{foc}}{CPFo \times IRF_{adj} \times FDF \times EF \times f_{lipid} \times BSAF}$$

Where: $IRF_{adj} = (FCR_{0\text{-}2} \times ED_{0\text{-}2} \times ADAF_{0\text{-}2} \times 1/BW_{0\text{-}2}) + (FCR_{2\text{-}6} \times ED_{2\text{-}6} \times ADAF_{2\text{-}6} \times 1/BW_{2\text{-}6}) + (FCR_{6\text{-}16} \times ED_{6\text{-}16} \times ADAF_{6\text{-}16} \times 1/BW_{6\text{-}16}) + (FCR_{16\text{-}70} \times ED_{16\text{-}70} \times ADAF_{16\text{-}70} \times 1/BW_{16\text{-}70})$

Cancer - Fish Tissue Consumption
Risk-based Sediment Concentration
Child/Adult Exposure

Oral Carcinogenic Potency Factor (CPFo) (kg-day/mg) = Chemical Specific
Mutagenic Tissue Ingestion Factor - Age-adjusted (IRF_{adj}) (g-year/kg-day) = 489.9936929
Age-Dependent Adjustment Factor - 0 - 2 years old ($ADAF_{0\text{-}2}$) = 10
Age-Dependent Adjustment Factor - 2 - 6 years old ($ADAF_{2\text{-}6}$) = 3
Age-Dependent Adjustment Factor - 6 - 16 years old ($ADAF_{6\text{-}16}$) = 3
Age-Dependent Adjustment Factor - 16 - 70 years old ($ADAF_{16\text{-}70}$) = 1
S_{foc} = Fraction of organic carbon in sediment (unitless) = Site Specific
f_{lipid} = lipid content in tissue (unitless) = Site Specific
BSAF = Biota-Sediment Accumulation Factor (unitless) = Chemical Specific
Acceptable cancer risk level (ACR) (1 in 1,000,000) untiless = 1.00E-06
Body weight ($BW_{0\text{-}2}$) (kg) = 9.2
Body weight ($BW_{2\text{-}6}$) (kg) = 15.2
Body weight ($BW_{6\text{-}16}$) (kg) = 44.3
Body weight ($BW_{16\text{-}70}$) (kg) = 81
Cancer Averaging Time (ATcr) (days) = 25550
Exposure Frequency (EF) (days/years) = 365
Exposure duration ($ED_{0\text{-}2}$) (years) = 2
Exposure duration ($ED_{2\text{-}6}$) (years) = 4
Exposure duration ($ED_{6\text{-}16}$) (years) = 10
Exposure duration ($ED_{16\text{-}70}$) (years) = 54
Fish consumption rate ($FCR_{0\text{-}2}$) (g/day) = 81
Fish consumption rate ($FCR_{2\text{-}6}$) (g/day) = 81
Fish consumption rate ($FCR_{6\text{-}16}$) (g/day) = 186
Fish consumption rate ($FCR_{16\text{-}70}$) (g/day) = 186
Fish Diet Fraction = 1
Unit conversion factor (UCF) (g/kg) = 1.00E+03

	CAS	Data Group	Chemical	Sediment Concentration mg/kg	Concentrations converted to ppb or ppt		
1	50-32-8	cPAH	Benzo(a)pyrene	9.32E-04	9.32E-01	ug/kg	ppb

Estimate fish tissue concentration from BSAF

Fish Tissue Concentration =

$$\frac{\text{Sediment Concentration} \times f_{lipid} \times BSAF}{S_{foc}}$$

APPENDIX L

CALCULATION SUMMARIES

Description: Contains calculations used as part of the RI/FS process including groundwater flow characteristics, PCL calculations for protection of sediment, and PQL calculation tables for applicable TEQ values.

Parameters for Groundwater Velocity

Parameters			
Head	h	ft	Measured
Distance	d	ft	Measured
Hydraulic Gradient	i	ft/ft	Calculated
Velocity	v	ft/day	Calculated
Hydraulic Conductivity	K	ft/day	Estimate[1]
Effective Porosity	n	dimensionless	Estimate[2]

Step 1: Measure depth to groundwater to determine head

Well ID	Elevation (TOC) (ft)	Depth to Groundwater 2/18/2020 (ft)	**Groundwater Elevation (head)(ft)**
MW-3	11.45	5.25	**6.20**
MW-6	12.31	4.27	**8.04**
MW-10A	10.71	1.68	**9.03**
MW-11A	11.91	3.18	**8.73**
MW-16	12.5	4.92	**7.58**
MW-17	12.2	4.82	**7.38**

Step 2: Calculate horizontal hydraulic gradient

Well Pair	Approximate Distance between paired wells (ft)	Change in head (ft)	Horizontal hydraulic gradient (ft/ft)
MW-6 to MW-3	650	1.84	0.00283
MW-10A to MW-17	945	1.65	0.00175
MW-11A to MW-16	950	1.15	0.00121
Average horizontal hydraulic gradient			**0.00193**

$$i = \frac{\Delta head}{\Delta distance}$$

Step 3: Calculate groundwater veolcity

Parameter	Value	Units
Estimated K	70	ft/day
Estimated n	0.3	dimesionless
Average i	0.00193	ft/ft
v =	0.450333333	ft/day

$$v = \frac{K \ * i}{n}$$

Step 4: Calculate approximate distance traveled over time

Time since possible contamination occurred	70	years
	25550	days
Estimated distance traveled over 70 years	11506.02	feet

References:

1) Domenico, P.A. and F.W. Schwartz, 1990. Physical and Chemical Hydrogeology, John Wiley & Sons, New York, 824 p.

2) Bonazountas, M. and Wagner, J.M. (1984). SESOIL: A Seasonal Soil Compartment Model, Draft Report. Office of Toxic Substances, U.S. Environmental Protection Agency: Washington, DC, PB86112406.

Parameters for Total PCB Congeners

Step 1 Params:				
Target Sediment Concentration:		0.035	mg/kg	Specific to Ecology
UCF	Unit conversion factor, default	0.001	mg/µg	Constant
DF	Dilution factor, default (saturated)	1	unitless	
	Distribution coefficient in sediment			
	Selected Sediment Kd			
K_d	(pH 8.0, Foc = 1.9%)	5870	L/kg	
θ_w	Water-filled soil porosity, LDW average	0.615	ml water/ml soil	
ρ_b	Dry soil bulk density, from Kmet 2016	1.02	kg/L	

Step 2 Params:				
UCF	Unit conversion factor, default	0.001	mg/µg	Constant
DF	Dilution factor, default (saturated)	1	unitless	
	Vadose	20		
	Saturated	1		
	Distribution coefficient in sediment			
	Selected Soil Kd			
K_d	(pH 6.8, Foc = 0.1%)	309	L/kg	
θ_w	Water-filled soil porosity, LDW average	0.615	ml water/ml soil	
	Vadose	0.3	ml water/ml soil	
	Saturated	0.43	ml water/ml soil	
θ_a	Air-filled soil porosity, default			
	Vadose	0.13	ml air/ml soil	
	Saturated	0	ml air/ml soil	
ρ_b	Dry soil bulk density, from Kmet 2016	1.02	kg/L	
H_{cc}	Henry's law constant at 13 degrees C		unitless	

Step 1: GW-3 (Ground water PCUL Protect Sediment, µg/L)

$$CUL\!-\!GW\!-\!SED = \frac{RBC\!-\!SED}{UCF\ x\ DF\ x\ \left[K_d + \frac{\theta_w}{\rho_b}\right]}$$

GW PCUL: 5.96E-03 µg/L

Step 2: Protect Sediment Vadose Zone

$$CUL\!-\!S\!-\!GW = CUL\!-\!GW\ x\ UCF\ x\ DF\ x\ \left[K_d + \frac{\theta_w + \theta_a H_{cc}}{\rho_b}\right]$$

Sediment 4E-02 mg/kg

Step 2: Protect Sediment Saturated Zone

Sediment 1.84E-03 mg/kg

PQL Calculation Tables
Jeld Wen/Former Nord Door Facility

Carcinogenic Polycyclic Aromatic Compounds (cPAHs) (mg/Kg)			
Analyte	**PQL**	**TEF**	**TEQ**
benzo[a]anthracene	0.006	0.1	0.0006
benzo[a]pyrene	0.006	1	0.006
benzo[b]fluoranthene	0.006	0.1	0.0006
benzo[k]fluoranthene	0.006	0.1	0.0006
chrysene	0.006	0.01	0.00006
dibenzo[a,h]anthracene	0.006	0.1	0.0006
indeno[1,2,3-cd]pyrene	0.006	0.1	0.0006
Total TEQ			**0.009**

*PQL per 8270-SIM method

*TEF per Table 708-2 (WAC 173-34-900)

Carcinogenic Polycyclic Aromatic Compounds (cPAHs) (ug/L)			
Analyte	**PQL**	**TEF**	**TEQ**
benzo[a]anthracene	0.01	0.1	0.001
benzo[a]pyrene	0.01	1	0.01
benzo[b]fluoranthene	0.01	0.1	0.001
benzo[k]fluoranthene	0.01	0.1	0.001
chrysene	0.01	0.01	0.0001
dibenzo[a,h]anthracene	0.01	0.1	0.001
indeno[1,2,3-cd]pyrene	0.01	0.1	0.001
Total TEQ			**0.015**

*PQL per 8270-SIM Low-Level method

*TEF per Table 708-2 (WAC 173-34-900)

PQL Calculation Tables
Jeld Wen/Former Nord Door Facility

Dioxins/Furans (pg/g)			
Analyte	**PQL**	**TEF**	**TEQ**
2,3,7,8-TCDD	0.5	1	0.5
1,2,3,7,8-PeCDD	2.5	1	2.5
1,2,3,4,7,8-HxCDD	2.5	0.1	0.25
1,2,3,6,7,8-HxCDD	2.5	0.1	0.25
1,2,3,7,8,9-HxCDD	2.5	0.1	0.25
1,2,3,4,6,7,8-HpCDD	2.5	0.01	0.025
OCDD	5	0.0003	0.0015
2,3,7,8-TCDF	0.5	0.1	0.05
1,2,3,7,8-PeCDF	2.5	0.03	0.075
2,3,4,7,8-PeCDF	2.5	0.3	0.75
1,2,3,4,7,8-HxCDF	2.5	0.1	0.25
1,2,3,6,7,8-HxCDF	2.5	0.1	0.25
1,2,3,7,8,9-HxCDF	2.5	0.1	0.25
2,3,4,6,7,8-HxCDF	2.5	0.1	0.25
1,2,3,4,6,7,8-HpCDF	2.5	0.01	0.025
1,2,3,4,7,8,9-HpCDF	2.5	0.01	0.025
OCDF	5	0.0003	0.0015
Total TEQ			**5.70**

*PQL per 1613 method

*TEF per Table 708-1 (WAC 173-34-900)

PQL Calculation Tables
Jeld Wen/Former Nord Door Facility

Dioxins/Furans (pg/L)			
Analyte	**PQL**	**TEF**	**TEQ**
2,3,7,8-TCDD	5	1	5
1,2,3,7,8-PeCDD	25	1	25
1,2,3,4,7,8-HxCDD	25	0.1	2.5
1,2,3,6,7,8-HxCDD	25	0.1	2.5
1,2,3,7,8,9-HxCDD	25	0.1	2.5
1,2,3,4,6,7,8-HpCDD	25	0.01	0.25
OCDD	50	0.0003	0.015
2,3,7,8-TCDF	5	0.1	0.5
1,2,3,7,8-PeCDF	25	0.03	0.75
2,3,4,7,8-PeCDF	25	0.3	7.5
1,2,3,4,7,8-HxCDF	25	0.1	2.5
1,2,3,6,7,8-HxCDF	25	0.1	2.5
1,2,3,7,8,9-HxCDF	25	0.1	2.5
2,3,4,6,7,8-HxCDF	25	0.1	2.5
1,2,3,4,6,7,8-HpCDF	25	0.01	0.25
1,2,3,4,7,8,9-HpCDF	25	0.01	0.25
OCDF	50	0.0003	0.015
Total TEQ			**57.0**

*PQL per 1613 method

*TEF per Table 708-1 (WAC 173-34-900)

APPENDIX M

SUMMARY OF UPLAND FS COSTS

Description: Contains unit costs and assumptions and scope of work for upland remedial actions used to conduct the DCA.

Creosote/Fuel Oil Area - Alternative 1

Sub-Slab Depressurization, Engineering Controls, and Institutional Controls

Sub-slab depressurization (SSD) below building floor slab, Engineering Controls, groundwater montoring, and institutional controls

Remedy Components:

1. Construction contractor mobilization
2. Pilot testing for SSD design
3. Install SSD system below existing building floor slabs
4. Install 5 additional monitoring wells
5. Groundwater monitoring for 20 years to confirm plume stability
6. Engineering controls (surface capping) to limit direct exposure and Institutional controls to restrict exposure to soil

Primary Assumptions

1. 200 scfm SSD system
2. 4 SSD pits within building
3. Capping unpaved areas on-property
4. SSD blower is 5 hp, 1000 lbs of carbon/yr
5. Groundwater monitoing and cap inspection/maintenance for 20 years
6. Institutional controls restricting soil exposure and soil management plan

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
Mobilization	est	1	$10,000	$10,000	
					$10,000
Pilot testing					
Install SSD point	each	1	$2,000	$2,000	
Install vapor monitoring points	each	8	$300	$2,400	
Perform test	each	1	$5,000	$5,000	
Reporting	each	1	$7,000	$7,000	
					$16,400
Capping (surface capping at unpaved areas)	est	1	$24,000	$24,000	
Institutional Controls	each	1	$25,000	$25,000	
					$49,000
Install SSD system					
Install SSD pits	each	3	$6,000	$18,000	
Piping	ft	500	$50	$25,000	
Blower system and carbon	est	1	$15,000	$15,000	
					$58,000
Install Monitoring wells					
Install wells	each	5	$4,000	$20,000	
					$20,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	15	$2,000	$30,000	
					(See NPV)
Subtotal					$153,400
Project Management 6%					$9,204
Design and permitting 15%					$23,010
Construction management 10%					$15,340
Tax 10%					$20,095
Contingency 25%					$38,350
Remedial Action Subtotal (Rounded to nearest $10,000)					**$260,000**
Monitoring and Maintenance					
Quarterlygroundwater monitoring and sampling (yrs 1-5)[1]	yr	5	$20,000	$100,000	
Annual groundwater monitoring and sampling (yrs 6-20)[1]	yr	15	$5,000	$75,000	
Annual reporting (yr 1)[1]	yr	1	$10,000	$10,000	
Annual reporting (yrs 2-20)[1]	yr	19	$4,000	$76,000	
SSD system O&M, electrical service, equipment repair	yr	20	$25,000	$500,000	
5 year review report (every 5 yrs)[1]	yr	4	$12,000	$48,000	
Subtotal NPV (see below)					$738,000
Tax 10%					$73,800
Contingency 20%					$147,600
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$960,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$1,200,000**

[1] Year 1 value shown

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost

SUM NPV:	$161,913	$446,629	$24,105	$105,358	**$738,000**
Year	**Monitoring**	**O&M**	**Decom**	**Reporting**	
1	$20,000	$25,000	$0	$10,000	
2	$20,000	$25,000	$0	$4,000	
3	$20,000	$25,000	$0	$4,000	
4	$20,000	$25,000	$0	$4,000	
5	$20,000	$25,000	$0	$12,000	
6	$5,000	$25,000	$0	$4,000	
7	$5,000	$25,000	$0	$4,000	
8	$5,000	$25,000	$0	$4,000	
9	$5,000	$25,000	$0	$4,000	
10	$5,000	$25,000	$0	$12,000	
11	$5,000	$25,000	$0	$4,000	
12	$5,000	$25,000	$0	$4,000	
13	$5,000	$25,000	$0	$4,000	
14	$5,000	$25,000	$0	$4,000	
15	$5,000	$25,000	$0	$12,000	
16	$5,000	$25,000	$0	$4,000	
17	$5,000	$25,000	$0	$4,000	
18	$5,000	$25,000	$0	$4,000	
19	$5,000	$25,000	$0	$4,000	
20	$5,000	$25,000	$30,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 2

Bioremediation and Sub-Slab Depressurization

Bioremediation (Bio) on- and off-property; Sub-Slab Depressurization (SSD) below existing building slab

Remedy Components:
1 Construction contractor mobilization
2 Pilot testing and Install SSD system below existing building floor slabs with bioremediation system
3 Additional assessment, bioremediation pilot testing set-up, perform pilot testing for one year
4 Install 22 shallow air injection (AI), 18 shallow NNS (nitrate/nutrient/surfactant solution), 10 deep AI, and 5 deep recirculation NNS wells
5 Install estimated 3,000 feet of piping
6 Install NNS, AI, and SVE system
7 Construction Management
8 System O&M and groundwater monitoring
9 Engeering controls (surface capping) to limit direct exposure and short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions
1 2 injection rounds of an estimated 200,000 lbs NNS each round
2 Injections require 1 month to perform
2 SVE installed in horizontal pipes in common trench
4 250 cfm AI, 400 cfm SVE/SSD, 60 gpm NNS system, 20,000 lb carbon consumed
5 Bioremediation System operates for 5 years
6 Groundwater sampling of 10 wells for 10 years (5 years semi-annually, 5 years annually)
7 Institutional controls restricting soil exposure and soil management plan

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
Mobilization	est	1	$15,000	$15,000	
					$15,000
Monitoring Well and Geoprobe installation					
Install monitoring wells	each	10	$4,000	$40,000	
Geoprobe borings	est	1	$40,000	$40,000	
Lab and Reporting	est	1	$20,000	$20,000	
					$100,000
Capping (surface capping at unpaved areas)	est	1	$24,000	$24,000	
Site Controls	est	1	$15,000	$15,000	
					$39,000
Pilot testing					
Install wells	each	4	$6,000	$24,000	
Install vertical recirculation well	each	1	$8,000	$8,000	
Testing Labor	month	6	$12,000	$72,000	
Equipment Rental and setup	month	6	$10,000	$60,000	
NNS chemicals	lbs	2,000	$33	$66,800	
Temporary power supply	LS	1	$10,000	$10,000	
Carbon vessels	each	2	$4,000	$8,000	
Install post test borings	LS	1	$10,000	$10,000	
Lab and Reporting	LS	1	$40,000	$40,000	
					$298,800
Bioremediation System					
AI wells	each	32	$3,000	$96,000	
NNS wells	each	18	$4,000	$72,000	
Vertical mixing wells	each	5	$8,000	$40,000	
Submersible pumps and headworks	each	14	$5,000	$70,000	
Trenching and Piping	feet	3,000	$110	$330,000	
Road Bore	LS	1	$40,000	$40,000	
Blowers and Enclosure	LS	1	$160,000	$160,000	
NNS addtion system	LS	1	$70,000	$70,000	
NNS chemicals	lbs	400,000	$3.40	$1,360,000	
NNS addition labor	LS	2	$45,000	$90,000	
Electrical Service	LS	1	$40,000	$40,000	
					$2,368,000
SSD					
Pilot testing	est	1	$16,400	$16,400	
System construction and equipment installation	est	1	$58,000	$58,000	
					$74,400
Decommissioning					
Monitoring Well Decommissioning[1]	each	55	$2,000	$110,000	
					(See NPV)
Subtotal					$2,895,200
Project Management 6%					$173,712
Design and permitting 15%					$434,280
Construction management 10%					$289,520

Remedial Action Component			Units	No. of Units	Unit Cost	Cost	Total Cost
Tax	10%						$379,271
Contingency	25%	(EPA 540-R-00-002)					$723,800
Remedial Action Subtotal (Rounded to nearest $10,000)							**$4,900,000**
Monitoring and Maintenance							
Semi-annual groundwater monitoring and sampling (yr 1-5)[1]			yr	5	$10,000	$50,000	
Groundwater monitoring and sampling - annual (yrs 6-10)[1]			yr	5	$5,000	$25,000	
Annual reporting (yr 1)[1]			yr	1	$10,000	$10,000	
Annual reporting (yrs 2-10)[1]			yr	8	$4,000	$32,000	
Bio systems and SSD O&M, electrical, equipment repair			yr	5	$40,000	$200,000	
5 year review report (every 5 yrs)[1]			yr	2	$12,000	$24,000	
Subtotal NPV (see below)							$461,000
Tax	10%						$46,100
Contingency	25%	(EPA 540-R-00-002)					$115,250
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)							**$620,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)							**$5,500,000**

[1] Year 1 value shown

SUM NPV:	$71,299	$193,566	$38,946	$98,601	$58,363	**$461,000**
Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
1	$10,000	$40,000	$14,000	$0	$10,000	
2	$10,000	$40,000	$8,000	$0	$4,000	
3	$10,000	$40,000	$8,000	$0	$4,000	
4	$10,000	$40,000	$6,000	$0	$4,000	
5	$10,000	$40,000	$4,000	$0	$12,000	
6	$5,000	$0	$0	$0	$4,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$110,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 3

In-Situ Chemical Oxidation and Sub-Slab Depressurization

In-Situ Chemical Oxidation (ISCO) using sodium persulfate injections and Sub-slab depressurization (SSD) below existing building slab

Remedy Components:
1 Construction contractor mobilization / injection planning
2 Additional assessment, SSD Pilot testing and system installation below existing building floor slabs with ISCO injections (first round)
3 Injection points roughly on 10 x 12 spacing, 1,000 points total for 3 events
4 Volumes estimates are 18,000, 20,000, and 1,500 cu yds for 0-15, 16 to 35, and 36 to 55 ft bgs
5 Three separate injection events using Regenesis PersulfOx planned approximately 1 year apart
6 Two groundwater sampling events and one Geoprobe sampling event before the second and third injections
7 SSD system consisting of 4 suction pits
8 Engeering controls (surface capping) to limit direct exposure and short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions
1 Assumes one full ISCO injection event followed by evaluation for effectiveness, assumes three injection events total
2 One year of semi-annual and three years of annual monitoring after last injection
3 Institutional controls restricting soil exposure and soil management plan

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
Mobilization	est	1	$50,000	$50,000	
					$50,000
Monitoring Well and Geoprobe installation					
Install monitoring wells	each	10	$4,000	$40,000	
Geoprobe borings	est	1	$60,000	$60,000	
Lab and Reporting	est	1	$20,000	$20,000	
					$120,000
Capping (surface capping at unpaved areas)	est	1	$24,000	$24,000	
Site Controls	est	1	$15,000	$15,000	
					$39,000
ISCO Pilot testing					
Well installation	each	3	$4,000	$12,000	
Injection Rig	day	3	$3,500	$10,500	
Chemical cost	lbs	2.25	$7,500	$16,875	
Lab and Reporting	est	1	$20,000	$20,000	
Water and miscellaneous cost	est	1	$2,000	$2,000	
					$61,375
ISCO (per event)					
Injection Rig	day	70	$3,500	$245,000	
Chemical cost	lbs	2.25	$565,000	$1,271,250	
Supply water, IDW disposal, and miscellaneous	est	1	$20,000	$20,000	
Total per event				$1,536,250	
Total for 3 events					$4,608,750
Two post injection Geoprobe investigations					
Geoprobe	est	2	$10,000	$20,000	
Lab and Reporting	est	2	$20,000	$40,000	
					$60,000
SSD					
Pilot testing	est	1	$16,400	$16,400	
System construction and equipment installation	est	1	$58,000	$58,000	
					$58,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	20	$2,000	$40,000	
					(See NPV)
Subtotal					$4,997,125
Project Management 4%					$199,885
Remedial Design 5%					$249,856
Construction Management 6%					$299,828
Tax 10%					$499,713
Contingency 30% (EPA 540-R-00-002)					$1,499,138
Remedial Action Subtotal (Rounded to nearest $100,000)					**$7,700,000**
Groundwater Monitoring, O&M, and Closure					
Semi-annual groundwater monitoring and sampling (yr 1)[1]	yr	1	$25,000	$25,000	
Groundwater monitoring and sampling - annual (yrs 2-4)[1]	yr	3	$12,000	$36,000	
SSD system O&M, electrical service, equipment repair	yr	3	$25,000	$75,000	
Annual reporting (yr 1)[1]	yr	1	$8,000	$8,000	
Annual reporting (yrs 2-4)[1]	yr	3	$4,000	$12,000	
5 year review report (every 5 yrs)[1]	yr	1	$12,000	$12,000	

Subtotal NPV (see below)		$188,000
Tax	10%	$18,800
Contingency	20%	$37,600
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)		**$240,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)		**$7,900,000**

[1] Year 1 value shown

SUM NPV:	$58,278	$73,380	$37,459	$18,861	**$188,000**
Year	**Monitoring**	**O&M**	**Decommissioning**	**Reporting**	
1	$0	$25,000	$0	$0	
2	$0	$25,000	$0	$0	
3	$25,000	$25,000	$0	$8	
4	$12,000	$0	$0	$4,000	
5	$12,000	$0	$0	$4,000	
6	$12,000	$0	$40,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 4

Soil Removal (on-property) and Bioremediation on- and off-property

Excavation and off-site disposal of contaminated on-property soil to 15 feet bgs and Bioremediation (Bio) on- and off-property

Remedy Components:
1 Construction contractor mobilization
2 Install Monitoring wells and Geoprobes
3 Demolish portions of the main manufacturing building for access to impacted soil for excavation
4 Install sheet-pile shoring to allow for soil excavation
5 Excavation of shallow soils to a depth of 15 feet below grade, hauling and off-site disposal
6 Building demolition, soil excavation, backfill, compaction, slab replacement, and partial building replacement.
7 Install Bioremediation system for deep on-property impacts and shallow and deep off-property impacts
6 Operate Bioremediation System for 5 years
7 Construction Management
8 Short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions
1 On-property soil excavation is estimated at 31,000 bcy
2 ACM in building is only in roofing
3 Excavation will require 1 year to complete followed by Bioremediation
4 5 feet of clean overburden, 20% of impacted soil requires special disposal
5 125 cfm AI, 200 cfm SVE, 5,000 lb carbon consumed, 30 gpm NNS (described in Alternative 2)
6 Two injections of NNS at 50,000 lbs each
7 Groundwater sampling of 10 wells for 10 years (5 years semi-annually, 5 years annually)
8 Institutional controls restricting soil exposure and soil management plan (off-property)

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
Mobilization	LS	1	$50,000	$50,000	
					$50,000
Monitoring Well and Geoprobe installation					
Install monitoring wells	each	10	$4,000	$40,000	
Install Geoprobes	est	1	$40,000	$40,000	
Lab and Reporting	est	1	$20,000	$20,000	
					$100,000
Site Controls / Institutional Controls (off-property)	est	1	$20,000	$20,000	
					$20,000
Excavation					
Demolish building	est	1	$1,050,000	$1,050,000	
Building disposal	sq ft	65,000	$2.50	$162,500	
Well abandonment	ea	5	$2,000	$10,000	
Shoring installation	sq ft	35,000	$75	$2,625,000	
Dewatering system	est	1	$100,000	$100,000	
Relocation of utilities in excavation area	est	1	$200,000	$200,000	
Excavation	bcy	31,000	$6	$186,000	
Disposal 5 to 15 feet regular waste	ton	23,147	$55	$1,273,067	
Disposal 5 to 15 feet persistent waste	ton	5,787	$400	$2,314,667	
Place and compact clean overburden	bcy	10,332	$5	$51,662	
Provide, place, and compact clean fill	bcy	20,667	$25	$516,667	
					$8,489,562
Bio Pilot testing					
Install wells	each	4	$6,000	$24,000	
Install vertical recirculation well	each	1	$8,000	$8,000	
Testing Labor	month	6	$12,000	$72,000	
Equipment Rental and setup	month	6	$10,000	$60,000	
NNS chemicals	lbs	2,000	$33	$66,800	
Temporary power supply	LS	1	$10,000	$10,000	
Carbon vessels	each	2	$4,000	$8,000	
Install post test borings	LS	1	$10,000	$10,000	
Lab and Reporting	LS	1	$40,000	$40,000	
					$298,800
Bioremediation System					
AI wells	each	14	$3,000	$42,000	
NNS wells	each	4	$4,000	$16,000	
Vertical mixing wells	each	4	$8,000	$32,000	
Submersible pumps and headworks	each	6	$5,000	$30,000	
Trenching and Piping	feet	1,500	$110	$165,000	
Road Bore	LS	1	$40,000	$40,000	
Blowers and Enclosure	LS	1	$110,000	$110,000	
NNS addtion system	LS	1	$50,000	$50,000	
NNS chemicals	lbs	100,000	$3.40	$340,000	
NNS addition labor	LS	2	$30,000	$60,000	
Electrical Service	LS	1	$40,000	$40,000	
					$925,000

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
Decommissioning					
Monitoring Well Decommissioning[1]	each	30	$2,000	$60,000	(See NPV)
Subtotal					$9,883,362
Project Management 6%					$593,002
Design and permitting 10%					$988,336
Construction management 8%					$790,669
Taxes 10%					$988,336
Contingency 25%					$2,470,840
Remedial Action Subtotal (Rounded to nearest $10,000)					**$15,710,000**
Monitoring and Maintenance					
Semi-annual groundwater monitoring and sampling (yr 1-5)[1]	yr	5	$10,000	$50,000	
Groundwater monitoring and sampling - annual (yrs 6-10)[1]	yr	5	$5,000	$25,000	
Annual reporting (year 1-2)[1]	yr	2	$10,000	$20,000	
Annual reporting (yrs 3 - 10)[1]	yr	8	$4,000	$32,000	
Bio systems O&M, electrical, equipment repair	yr	5	$32,000	$160,000	
5 year review report (every 5 yrs)[1]	yr	2	$12,000	$24,000	
Subtotal NPV (see below)					$350,000
Taxes 10%					$35,000
Contingency 20%					$70,000
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$460,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$16,200,000**

[1] Year 1 value shown

SUM NPV:	$70,523	$153,168	$9,827	$53,197	$63,534	**$350,000**
Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
1	$0	$0	$6,000	$0	$0	
2	$10,000	$32,000	$2,000	$0	$10,000	
3	$10,000	$32,000	$2,000	$0	$10,000	
4	$10,000	$32,000	$0	$0	$4,000	
5	$10,000	$32,000	$0	$0	$4,000	
6	$10,000	$32,000	$0	$0	$12,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$0	$4,000	
11	$5,000	$0	$0	$60,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 5

Thermal Treatment on- and off-property with short-term Sub-Slab Depressurization

Thermal Treatment (TT) using steam-enhanced extraction on- and off-property, short-term Sub-Slab Depressurization (SSD) below existing building floor slab

Remedy Components:

1 Construction contractor mobilization
2 Completing an estimated 50 Geoprobe borings for additional sampling for bench testing of thermal treatment (TT)
3 Contractor bench testing of steam-enhanced extraction (SSE) for TT
4 Install approximately 70 multi depth injection and 35 extraction points for the SSE
5 Install steam plant, piping, treatment facilities, operations trailer
6 Construction Management
7 System O&M and groundwater monitoring
8 Install short-term SSD system below existing building slab for duration of SEE system operation
9 Engeering controls (surface capping) to limit direct exposure and short-term institutional controls to restrict exposure to remediation efforts

Primary Assumptions

1 Treatment volume is 142,000 bcy for SEE
2 Approximately 2100 kw steam input
4 Capacity in existing natural gas line adjacent to the Site
5 Approximately 18 months of SEE design and construction and 6 months SEE system operation
6 Utilities in road are less than 5 feet deep
7 Existing borings and wells to be abandoned to allow for SSE application
8 Semiannual groundwater sampling of 10 wells for 2 years

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
SSE contractor mobilization	LS	1	$1,000,000	$1,000,000	
					$1,000,000
Geoprobe installation, well abandonment, bench test					
Install Geoprobes	each	50	$2,500	$125,000	
Well and boring abandonment	each	30	$1,000	$30,000	
Bench Test	est	1	$10,000	$10,000	
Lab and Reporting	est	1	$26,000	$26,000	
					$191,000
Steam-enhanced extraction (SSE) and Sub-Slab Depressurization (SSD)					
Install multidepth injection points	each	70	$20,000	$1,400,000	
Install extraction points	each	35	$8,000	$280,000	
Injection and extraction piping	ft	10000	$125	$1,250,000	
Steam Plant	LS	1	$750,000	$750,000	
SSD Pilot testing	est	1	$16,400	$16,400	
SSD System construction and equipment installation	est	1	$58,000	$58,000	
Utility connection	ls	1	$80,000	$80,000	
Water Treatment system	est	1	$20,000	$20,000	
Discharge permitting	est	1	$15,000	$15,000	
Labor for system operation	month	6	$120,000	$720,000	
Utility cost	month	6	$125,000	$750,000	
Carbon Useage	lbs	100,000	$2.00	$200,000	
Product disposal	tons	10	$400.00	$4,000	
System decommisioning	est	1	$550,000	$550,000	
					$6,093,400
Post remediation monitoring well installation					
Install wells	each	10	$4,000	$40,000	
Lab and reporting	est	1	$30,000	$30,000	
					$70,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	10	$2,000	$20,000	
					(See NPV)
Subtotal					$7,354,400
Project Management 6%					$441,264
Design and permitting 10%					$735,440
Construction management 8%					$588,352
Taxes 10%					$735,440
Contingency 25%					$1,838,600
Remedial Action Subtotal (Rounded to nearest $100,000)					**$11,700,000**
Monitoring and Maintenance					
Semi annual groundwater monitoring and sampling (yr 1-2)[1]	yr	2	$10,000	$20,000	
Annual reporting (yr 1)[1]	yr	1	$6,000	$6,000	
Final Report	yr	1	$12,000	$12,000	
SSD system O&M, electrical service, equipment repair	yr	1	$25,000	$25,000	
Subtotal NPV (see below)					$81,000
Taxes 10%					$8,100

Remedial Action Component		Units	No. of Units	Unit Cost	Cost	Total Cost
Contingency	20%					$16,200
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)						**$110,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)						**$11,800,000**

[1] Year 1 value shown

SUM NPV:	$19,461	$24,728	$19,354	$17,483	**$81,000**
Year	**Monitoring**	**O&M**	**Decom**	**Reporting**	
1	$0	$25,000	$0	$0	
2	$10,000	$0	$0	$6,000	
3	$10,000	$0	$20,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 6

In-Situ Stabilization/Solidification on and off--property, Thermal Treatment off-property

In-Situ Stabilization/Solidification (ISS) targeting shallow on- and off- property and thermal treatment (TT) targeting off-property shallow and deep

Remedy Components:
1 Construction contractor mobilization
2 Completing and estimated 50 geoprobe boring for additional sampling for bench testing of thermal treatment and ISS mixtures
3 Bench testing for ISS and TT
4 Demolish portions of the main manufacturing building for access to impacted soil for ISS
5 Perform soil stabilization on-property to approximately 50 feet bgs
6 Install approximately 25 multidepth injection and 12 extraction points off-property to a depth of 50 feet bgs for TT
7 Install steam plant, piping, treatment facilites, operations trailer
8 System O&M and groundwater monitoring
9 Construction Management
10 Short-term institutional controls to restrict exposure to remediation efforts

Primary Assumptions
1 Approximately 95,000 bcy treated by ISS
2 Approximately 46,000 bcy treated by SEE
3 ACM in building is only in roofing
4 2150 kw steam input
5 Capacity in exisitng natural gas line adjacent to the Site
6 Approximately 8 months design and construction, 6 months operation for SEE
7 Utilities in road are less than 5 feet deep
8 Existing borings and wells to be abandon to allow for SSE application
9 Short-term controls to restrict exposure to remediation efforts
10 Semiannual groundwater sampling of 10 wells for 2 years

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
SSE contractor mobilization	LS	1	$600,000	$600,000	
					$600,000
Geoprobe installation, well abandonment, bench test					
Install Geoprobes	each	50	$2,500	$125,000	
Well and boring abandonment	each	20	$1,000	$20,000	
Bench Tests	LS	1	$20,000	$20,000	
Lab and Reporting	LS	1	$26,000	$26,000	
					$191,000
Short-term Institutional Controls	each	1	$25,000	$25,000	
					$25,000
ISS					
Demolish building	est	1	$1,050,000	$1,050,000	
Building disposal	sq ft	65,000	$2.50	$162,500	
ISS	bcy	95,000	$70	$6,650,000	
Relocation of utilities in excavation area	est	1	$200,000	$200,000	
					$7,862,500
SEE					
Install wells	each	100	$4,000	$400,000	
Injection and extraction piping	ft	4500	$100	$450,000	
Steam Plant	LS	1	$500,000	$500,000	
Utility connection	ls	1	$80,000	$80,000	
Water Treatment system	LS	1	$20,000	$20,000	
Discharge permitting	LS	1	$15,000	$15,000	
Labor for system operation	month	6	$100,000	$600,000	
Utility cost	month	6	$40,000	$240,000	
Carbon Useage	lbs	30,000	$2.00	$60,000	
Product disposal	tons	3	$400.00	$1,200	
System decommisioning	LS	1	$240,000	$240,000	
					$2,606,200
Post remediation monitoring well installation					
Install wells	each	10	$4,000	$40,000	
Lab and reporting	LS	1	$30,000	$30,000	
					$70,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	10	$2,000	$20,000	
					(See NPV)
Subtotal					$11,354,700

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
Project Management 6%					$681,282
Design and permitting 10%					$1,135,470
Construction management 8%					$908,376
Taxes 10%					$1,135,470
Contingency 25%					$2,838,675
Remedial Action Subtotal (Rounded to nearest $10,000)					**$18,050,000**
Monitoring and Maintenance					
Semi annual groundwater monitoring and sampling (yr 1-2)[1]	yr	2	$10,000	$20,000	
Annual reporting (yr 1)[1]	yr	1	$6,000	$6,000	
Final Report	yr	1	$12,000	$12,000	
Subtotal NPV (see below)					$56,000
Taxes 10%					$5,600
Contingency 20%					$11,200
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$70,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$18,100,000**

[1] Year 1 value shown

SUM NPV:	$19,461	$0	$0	$19,354	$17,483	**$56,000**
Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
1	$0	$0	$0	$0	$0	
2	$10,000	$0	$0	$0	$6,000	
3	$10,000	$0	$0	$20,000	$12,000	

Notes:
Discount rate = 1.1%
OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)
Total NPV shown is rounded to nearest $1,000

Creosote/Fuel Oil Area - Alternative 7

Hotspot Soil Removal (on-property) and Bioremediation on- and off-property

Excavation and off-site disposal of contaminated on-property soil to 9 feet bgs and Bioremediation (Bio) on- and off-property

Remedy Components:

1. Construction contractor mobilization
2. Install Monitoring wells and Geoprobes
3. Perform Bio pilot testing on property
4. Demolish portions of the main manufacturing building for access to impacted soil for excavation
5. Install sheet-pile shoring or (other methods) to allow for soil excavation
6. Excavation of shallow soils to a depth of 9 feet below grade, hauling and off-site disposal
7. Building demolition, soil excavation, backfill, compaction, slab replacement, and partial building replacement.
8. Install Bioremediation system for deep on-property impacts and shallow and deep off-property impacts
9. Operate Bioremediation System for 5 years
10. Construction Management
11. Short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions

1. On-property soil excavation is estimated at 12,000 bcy (approximately 350ft x 100ft, by 9 feet depth)
2. Building removal 20 feet back from excavation retangle for access (36,000 square feet)
3. Additional assessment, bioremediation pilot testing set-up, perform pilot testing for one year
4. ACM in building is only in roofing
5. Building demolition, shoring installation, excavation, backfilling, and partial building replacement will require 1 year to complete followed by Bioremediation
6. 3 feet of clean overburden, 10% of impacted soil requires special disposal
7. 150 cfm AI, 240 cfm SVE, 10,000 lb carbon consumed, 40 gpm NNS (described in Alternative 2)
8. Two injections of NNS at 125,000 lbs each
9. Groundwater sampling of 10 wells for 10 years (5 years semi-annually, 5 years annually)
10. Institutional controls restricting soil exposure and soil management plan (off-property)

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Mobilization					
Mobilization	est	1	$50,000	$50,000	
					$50,000
Monitoring Well and Geoprobe installation					
Install monitoring wells	each	10	$4,000	$40,000	
Install Geoprobes	est	1	$40,000	$40,000	
Lab and Reporting	est	1	$20,000	$20,000	
					$100,000
Site Controls / Institutional Controls (off-property)	est	1	$20,000	$20,000	
					$20,000
Excavation					
Demolish building	est	1	$921,000	$921,000	
Building disposal	sq ft	39,200	$2.50	$98,000	
Well abandonment	ea	3	$2,000	$6,000	
Shoring installation	ln ft	1,950	$350	$682,500	
Dewatering system	est	1	$100,000	$100,000	
Relocation of utilities in excavation area	est	1	$200,000	$200,000	
Excavation	bcy	12,000	$6	$72,000	
Disposal 3 to 9 feet regular waste (90%)	ton	10,080	$55	$554,400	
Disposal 3 to 9 feet persistent waste (10%)	ton	1,120	$400	$448,000	
Place and compact clean overburden	bcy	4,000	$5	$19,998	
Provide, place, and compact clean fill	bcy	8,000	$25	$200,000	
					$3,301,898
Bio Pilot testing					
Install wells	each	4	$6,000	$24,000	
Install vertical recirculation well	each	1	$8,000	$8,000	
Testing Labor	month	6	$12,000	$72,000	
Equipment Rental and setup	month	6	$10,000	$60,000	
NNS chemicals	lbs	2,000	$33	$66,800	
Temporary power supply	LS	1	$10,000	$10,000	
Carbon vessels	each	2	$4,000	$8,000	
Install post test borings	LS	1	$10,000	$10,000	
Lab and Reporting	LS	1	$40,000	$40,000	
					$298,800

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
Bioremediation System					
AI wells	each	19	$3,000	$57,000	
NNS wells	each	9	$4,000	$36,000	
Vertical mixing wells	each	5	$8,000	$40,000	
Submersible pumps and headworks	each	10	$5,000	$50,000	
Trenching and Piping	feet	2,000	$110	$220,000	
Road Bore	LS	1	$40,000	$40,000	
Blowers and Enclosure	LS	1	$130,000	$130,000	
NNS addtion system	LS	1	$60,000	$60,000	
NNS chemicals	lbs	250,000	$3.40	$850,000	
NNS addition labor	LS	2	$35,000	$70,000	
Electrical Service	LS	1	$40,000	$40,000	
					$1,593,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	42	$2,000	$84,000	
					(See NPV)
Subtotal					$5,363,698
Project Management 6%					$321,822
Design and permitting 10%					$536,370
Construction management 8%					$429,096
Taxes 10%					$536,370
Contingency 25%					$1,340,925
Remedial Action Subtotal (Rounded to nearest $10,000)					**$8,530,000**
Monitoring and Maintenance					
Semi-annual groundwater monitoring and sampling (yr 1-5)[1]	yr	5	$10,000	$50,000	
Groundwater monitoring and sampling - annual (yrs 6-10)[1]	yr	5	$5,000	$25,000	
Annual reporting (year 1-2)[1]	yr	2	$10,000	$20,000	
Annual reporting (yrs 3 - 10)[1]	yr	8	$4,000	$32,000	
Bio systems O&M, electrical, equipment repair	yr	5	$32,000	$160,000	
5 year review report (every 5 yrs)[1]	yr	2	$12,000	$24,000	
Subtotal NPV (see below)					$381,000
Taxes 10%					$38,100
Contingency 20%					$76,200
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$500,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$9,000,000**

[1] Year 1 value shown

	Monitoring	O&M	Carbon	Decom	Reporting	
SUM NPV:	$70,523	$153,168	$19,377	$74,476	$63,534	**$381,000**
Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
1	$0	$0	$2,000	$0	$0	
2	$10,000	$32,000	$6,000	$0	$10,000	
3	$10,000	$32,000	$6,000	$0	$10,000	
4	$10,000	$32,000	$4,000	$0	$4,000	
5	$10,000	$32,000	$2,000	$0	$4,000	
6	$10,000	$32,000	$0	$0	$12,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$0	$4,000	
11	$5,000	$0	$0	$84,000	$12,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Woodlife Area - Alternative 1

Engineering Controls, Institutional Controls, an Long-Term Groundwater Monitoring

Engineering Controls (EC) consisting of surface pavement, Institutional Controls (IC), Long-Term Monitoring to confirm groundwater plume stability

Remedy Components:

1. Pavement Inspection
2. Install and Repair Pavement
3. Install Monitoring Wells
4. Groundwater monitoring for 20 years to confirm plume stability
5. Engeering controls (surface capping) to limit direct exposure and Institutional controls to restrict exposure to soil

Primary Assumptions

1. Area is primarily paved, inspections will be completed to comfirm pavement is in satisfactory condition
2. Installation of four additional groundwater monitoring wells
3. Groundwater sampling of 6 wells for 20 years (2 years semiannually, 18 years annually)
4. Institutional controls restricting soil exposure and soil management plan

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Asphalt Pavement					
Pavement	sf	3,000	$3.78	$11,340	
Inspections	each	20	$1,000	$20,000	
					$31,340
Surveying					
Cap area for I.C. and monitoring wells	estimate	1	$2,000	$2,000	
					$2,000
Monitoring Well installation					
Install monitoring wells	each	4	$4,000	$16,000	
Lab and Reporting	est	1	$20,000	$20,000	
					$36,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	6	$2,000	$12,000	
					(See NPV)
Institutional Controls	each	1	$25,000	$25,000	
					$25,000
Subtotal					$94,340
Project Management 6%					$5,660
Design and permitting 5%					$4,717
Construction management 8%					$7,547
Taxes 10%					$9,434
Contingency 15% (EPA 540-R-00-002)					$14,151
Remedial Action Subtotal (Rounded to nearest $10,000)					**$140,000**
Monitoring and Maintenance					
Semiannual groundwater monitoring and sampling (yr 1-2)[1]	yr	2	$10,000	$20,000	
Groundwater monitoring and sampling - annual (yrs 3-20)[1]	yr	18	$5,000	$90,000	
Annual reporting (year 1-2)[1]	yr	2	$10,000	$20,000	
Annual reporting (yrs 3 - 20)[1]	yr	18	$4,000	$72,000	
5 year review report (every 5 yrs)[1]	yr	4	$12,000	$48,000	
Subtotal NPV (see below)					$213,000
Taxes 10%					$21,300
Contingency 20%					$42,600
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$280,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $10,000)					**$420,000**

[1] Year 1 value shown

SUM NPV:	$99,163	$0	$0	$9,642	$104,343	**$213,000**
Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
1	$10,000	$0	$0	$0	$10,000	
2	$10,000	$0	$0	$0	$10,000	
3	$5,000	$0	$0	$0	$4,000	
4	$5,000	$0	$0	$0	$4,000	
5	$5,000	$0	$0	$0	$4,000	
6	$5,000	$0	$0	$0	$12,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$0	$4,000	
11	$5,000	$0	$0	$0	$4,000	
12	$5,000	$0	$0	$0	$12,000	
13	$5,000	$0	$0	$0	$4,000	
14	$5,000	$0	$0	$0	$4,000	
15	$5,000	$0	$0	$0	$4,000	
16	$5,000	$0	$0	$0	$4,000	
17	$5,000	$0	$0	$0	$4,000	
18	$5,000	$0	$0	$0	$12,000	
19	$5,000	$0	$0	$0	$4,000	
20	$5,000	$0	$0	$12,000	$4,000	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Woodlife Area - Alternative 2

Soil Removal

Soil Removal, confirmation sampling, and post removal groundwater monitoring

Remedy Components:

1. Excavation contractor mobilization
2. Install wall supports for building stability during soil excavation
3. Excavation of shallow soils to an estimated depth of 7 feet with disposal
4. Backfill and building repair
5. Construction management and oversight
6. Monitoring well installation
7. Short-term site controls during excavation

Primary Assumptions

1. Soil excavation is 6,900 bcy (estimate)
2. Proposed soil excavation is limited to 7 feet bgs based on sampling completed
3. Limited clean overburden soil, not used for backfill source
4. Soil waste can be disposed as special waste at an approved landfill
5. Groundwater sampling of 6 wells for 4 years (semi-annual sampling) following removal
6. Short-term site controls during remedial action

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost
REMEDIAL ACTION					
Remedial action contractor					
Mobilization	each	1	$10,000	$10,000	
Sediment and erosion control	L.S.	1	$2,000	$2,000	
Building wall support for excavation under building (estimate)	lf	170	$500	$85,000	
Pavement Removal	sy	2,955	$5.40	$15,957	
Excavation	bcy	6,900	$4.00	$27,600	
Excavated soil hauling and landfill disposal	tons	7,728	$55	$425,040	
Provide, place, and compact clean fill	bcy	6,900	$20	$138,000	
					$703,597
Excavation Dewatering					
Equipment (Baker tanks, bag filter unit, pump, tank cleanup)	month	2	$10,000	$20,000	
Activated carbon drums and disposal	est	1	$8,000	$8,000	
Discharge permits / monitoring	est	1	$5,000	$5,000	
					$33,000
Soil Confirmation Testing					
Sample Collection/Field Oversight	day	20	$1,200	$24,000	
Dioxins/Furans analytical testing	each	30	$750	$22,500	
					$46,500
Asphalt Pavement					
Pavement	sf	26,600	$3.78	$100,548	
Replant unpaved area (grass seed)	estimate	1	$500	$500	
					$101,048
Surveying					
Cap area / monitoring wells	estimate	1	$2,000	$2,000	
					$2,000
Monitoring Well installation					
Install monitoring wells	each	4	$4,000	$16,000	
Lab and Reporting	LS	1	$20,000	$20,000	
					$36,000
Decommissioning					
Monitoring Well Decommissioning[1]	each	6	$2,000	$12,000	
					(See NPV)
Short-term Site Controls	est	1	$10,000	$10,000	
					$10,000

Subtotal			$932,145
Project Management	6%		$55,929
Design and permitting	10%		$93,215
Construction management	8%		$74,572
Taxes	10%		$93,215
Contingency	30%	(EPA 540-R-00-002)	$279,644
Remedial Action Subtotal (Rounded to nearest $10,000)			**$1,530,000**

Remedial Action Component		Units	No. of Units	Unit Cost	Cost	Total Cost
Monitoring and Maintenance						
Semiannual groundwater monitoring and sampling (yr 1-4)[1]		yr	4	$10,000	$40,000	
Groundwater monitoring and sampling - annual (yrs 5-10)[1]		yr	0	$5,000	$0	
Annual reporting (year 1-4)[1]		yr	4	$10,000	$40,000	
Annual reporting (yrs 4-10)[1]		yr	0	$4,000	$0	
O&M		yr	0	$0	$0	
5 year review report (every 5 yrs)[1]		yr	0	$12,000	$0	
Subtotal NPV (see below)						$89,000
Taxes	10%					$8,900
Contingency	20%					$17,800
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)						**$120,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)						**$1,700,000**

[1] Year 1 value shown

SUM NPV:	$38,924	$0	$0	$11,486	$38,924	**$89,000**
Year	**Monitoring**	**O&M**		**Decom**	**Reporting**	
1	$10,000	$0		$0	$10,000	
2	$10,000	$0		$0	$10,000	
3	$10,000	$0		$0	$10,000	
4	$10,000	$0		$12,000	$10,000	
5	$0	$0		$0	$0	
6	$0	$0		$0	$0	
7	$0	$0		$0	$0	
8	$0	$0		$0	$0	
9	$0	$0		$0	$0	
10	$0	$0		$0	$0	
11	$0	$0		$0	$0	
12	$0	$0		$0	$0	

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

APPENDIX N

SUMMARY OF MARINE FS COSTS

Description: Contains a summary of the cost assumptions and the detailed cost estimates used to conduct the DCA.

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ANCHOR QEA

Memorandum

March 30, 2021

To: Nathan Soccorsy, Anchor QEA

From: Jason Cornetta, Anchor QEA

cc: Scott Miller, SLR

Re: Updated Summary of Cost Assumptions Used in the 2020 JELD-WEN, Inc. Former Nord Door Facility Feasibility Study

This memorandum summarizes the unit cost and volume assumptions used to estimate quantities and costs for the seven remedial alternatives (M1, M2, M3, M4, M5, M6, and M7) evaluated in the 2020 Draft Final Feasibility Study for the JELD-WEN, Inc. Former Nord Door Facility, in Everett, Washington. The assumptions presented herein are based on recent similar sediment remediation project experience and contractor bids for Puget Sound projects. They include equipment usage, production rates, limitations of intertidal construction conditions, and best professional judgement.

Basis for Unit Costs and Assumptions

Table N-1 provides a summary of unit costs used to develop cost estimates for the seven remedial alternatives, along with assumptions for the major construction components and indirect construction costs. Comments regarding the source or basis for these assumptions are also included.

Excavation of intertidal sediment, capping, and backfill placement costs generally assume relatively uninhibited site access from the uplands. Equipment and production rate assumptions are generally consistent with those typically achieved during similar sediment remediation projects in Puget Sound, recognizing the constraints of shallow water, limited tide cycles for work to be performed in the dry, and equipment access on soft, saturated intertidal sediments. The actual production rates that can be achieved are dependent on the selected remediation contractor’s equipment, experience, and means and methods, as well as site conditions encountered during construction.

Because the remedial areas are accessible to land-based equipment during low tide, unit costs generally assume that work can be performed in the dry with land-based construction equipment during low tide windows. Access using marine equipment is limited by the shallow water depths and was assumed to be infeasible. Where excavation or demolition activities are adjacent to steeper upland slopes, it is assumed that some degree of temporary shoring will be necessary to facilitate safe removal of structures and sediment. Where dredge cuts are deeper than 4 feet (Alternatives M6 and M7) it is assumed that some removal work will require excavation dewatering.

Sediment Excavation/Dredging and Material Placement Assumptions

In addition to the unit cost assumptions summarized in Table N-1, the total cost of each remedial alternative will be a function of the area of remediation and/or volume of material addressed. Table N-2 presents the assumptions used to develop the excavation volumes and material placement quantities for each of the seven remedial alternative cost estimates.

Disposal and Beneficial Reuse Assumptions

Disposal assumptions do not consider adjacent upland areas on the site, or any beneficial reuse capacity that may be associated with those areas. The upland capacity and regulatory requirements for suitability of excavated intertidal sediments to be used as backfill in upland excavations will be further evaluated during remedial design. While preliminary evaluations indicate that the upland area adjacent to the site could provide capacity for beneficial reuse opportunities, the disposal assumption used in this Feasibility Study is that excavated intertidal sediments would be sent off site for disposal in an upland Subtitle D landfill.

The Snohomish River has been identified as a potential source of beneficial reuse backfill, cap, and cover materials; however, the availability and quantity of Snohomish River beneficial reuse material is currently unknown. Further evaluation of this potential source is required during remedial design. In general, the costs for the various EMNR, capping, and backfill materials is highly dependent on location of the source and availability. For the purposes of this Feasibility Study, costs for these materials assume that a locally available source or sources, with sufficient quantities, exists at the time of construction.

Indirect Costs

To estimate indirect construction costs associated with construction monitoring/management activities, estimated production rates for the primary construction activities were used to determine construction durations. These construction durations were used in conjunction with monthly unit costs and best professional judgement, to estimate the major indirect construction costs for the seven remedial alternatives. Indirect construction costs included in these estimates are as follows:

- Predesign investigation
- Project management
- Engineering design and support during construction
- Permitting
- Construction management
- Environmental monitoring during construction
- Verification sampling
- Institutional controls
- Long-term monitoring and maintenance of the selected alternative

No habitat mitigation costs are included in the Feasibility Study cost estimates. Any requirements for mitigation will be determined during the remedial design. Table N-1 provides a summary of unit cost assumptions for the major indirect costs.

Contingency Assumptions

In addition to the above assumptions, it is appropriate to apply a contingency to direct construction costs, reflecting the conceptual nature of the potential remedial alternatives and to account for changes in scope because remedial options are more completely defined during predesign investigations and remedial design. For purposes of estimating remedial costs, a contingency of 30% will be applied to the direct construction costs. No contingency is applied to indirect construction costs.

Total Alternative Costs

Total alternative costs are summarized in Table N-3. Alternative costs are the sum of direct construction costs and indirect construction costs.

Detailed Alternative Costs

Detailed alternative costs are summarized in Tables N-4 through N-10. Detailed alternative costs included the assumptions and calculated quantities associated with each of the seven alternatives.

Table N-1
Unit Cost Assumptions

Element	Unit Cost	Unit	Source and/or Comment
DIRECT CONSTRUCTION COSTS			
Mobilization	$200,000	Construction Season	Typical Puget Sound project experience. Multi-season projects will incur higher mobilization cost. Using a percentage of total construction costs would result in overestimate of true mobilization costs for the higher cost alternatives.
Demobilization	$100,000	Lump Sum	Typical Puget Sound project experience. Applied as a one-time cost at the end of the project.
Removal of piling and large woody debris	$250	Each	Based on recent project experience.
Processing, Transportation and disposal of creosote debris	$225	Ton	Based on recent project experience.
Prepare upland staging for dredged sediments	$150,000	Lump Sum	Based on recent project experience.
Prepare upland staging (no dredging)	$80,000	Lump Sum	Based on recent project experience.
Demolition of remnant barge structure	$30,000	Lump Sum	Based on recent project experience.
Demolition of bulkhead structures	$200,000	Lump Sum	Lump sum cost includes $95,000 for demolition and shoring estimate of $300/linear foot (350 linear feet). Below-grade extent of structures is unknown. Protection of utilities at top of slope is required. No available geotechnical data.
Shoreline protection at top of bank (hard armor)	$100	Linear Foot	Based on recent project experience for placing filter and armor layers on shoreline slopes. Armor size would be determined during remedial design.
Enhanced Monitored Natural Recovery			
Procure and transport beneficial reuse silty sand material	$15	Ton	Based on recent project experience, highly dependent on locally available sources at the time of construction. Assumes locally available source.
Place 12-inch-thick silty sand material	$30	Ton	Based on equipment and production rates for similar placement methods from recent project experience assuming low tide work on soft intertidal subgrades.
Dredge and Disposal			
Dredging: Land-based equipment	$35	Cubic yard	Based on equipment and production rates for similar excavation methods from recent

Table N-1
Unit Cost Assumptions

Element	Unit Cost	Unit	Source and/or Comment
			project experience assuming low tide work on soft intertidal subgrades.
Dredging: Slope shoring and protection of utilities/road	$500	Linear Foot	Higher per linear foot cost for excavation shoring and protection of utilities. No geotechnical data available.
Excavation dewatering	$80,000	Lump Sum	Based on best professional judgement. Areas with removal depths greater than 4 feet are assumed to require some dewatering to achieve design depths. It is assumed that water from excavation dewatering can be managed with the dredge material stockpile dewatering system and that excavation water would be pumped to this system; additional capacity may be required.
Sediment stockpiling	$5	Cubic yard	Based on recent project experience.
Dredge material stockpile dewatering and treatment	$12,500	Monthly	Equipment and labor costs for basic water management during sediment stockpile dewatering. Additional capacity and treatment requirements would be determined during remedial design.
Placing removed material as upland beneficial reuse material	$10	Cubic yard	Cost retained but no quantities included in the current estimates.
Dredged Material Transport and Disposal, Subtitle D	$83	Ton	Based on recent project experience.
Engineered Cap and Backfill			
Purchase and transport backfill material	$15	Ton	Based on recent project experience, highly dependent on locally available sources at the time of construction.
Place backfill material	$15	Ton	Based on equipment and production rates for similar placement methods from recent project experience assuming low tide work on soft intertidal subgrades.
Purchase and transport engineered cap material	$15	Ton	Based on recent project experience, highly dependent on locally available sources at the time of construction.
Place engineered cap material	$30	Ton	Based on equipment and production rates for similar placement methods from recent project experience assuming low tide work on soft intertidal subgrades.

Table N-1
Unit Cost Assumptions

Element	Unit Cost	Unit	Source and/or Comment
Environmental controls	$100,000	Each	Best professional judgement. One lump sum amount for capping and one lump sum amount for dredging. Assumes deployment of turbidity curtain around active construction areas as needed to control turbidity.
Bathymetric surveys and/or topographic surveys	$10,000	Each	Based on recent project experience. Surveys assumed to be bathymetric, topographic, or a combination of the two. Number of surveys based on components of each alternative including: • Pre- and post-construction • EMNR (1 to 3 separate areas or sub-SMAs) • Capping (3 layers for 3 separate areas or sub-SMAs) • Dredging and backfill (1 to 3 separate areas or sub-SMAs)
INDIRECT CONSTRUCTION COSTS			
Predesign investigation	$200,000	Lump Sum	Best professional judgement.
Project management	$42,100	Month	Assumes 1 staff level engineer full time, 1 principal engineer part time (60 hrs.), and 1 project assistant part time (60 hrs.).
Engineering and design	$208,000 (Alt. 2) to $1,720,000 (Alt. 8)	Lump Sum	Assumes engineering and design costs are approximately 5% of the direct construction costs.
Permitting	$100,000	Lump Sum	Best professional judgement.
Construction management support	$44,800	Month	Assumes 1 staff level engineer full time and 1 principal engineer part time (80 hrs.).
Environmental monitoring during construction	$34,400	Month	Assumes 1 staff level engineer full time and 1 principal engineer part time (40 hrs.).
Verification sampling	$10,000	Acre	Verification sampling only applied to dredged areas. Any additional sediment sample collection in nondredge areas would be included in the predesign investigation sampling.
Institutional controls	$16,500	Acre	Based on 2019 Snohomish County assessed value.

Table N-1
Unit Cost Assumptions

Element	Unit Cost	Unit	Source and/or Comment
Long-term monitoring	• $399,360 (Alt. M1) • $581,160 (Alts. M2, M3, M4) • $471,960 (Alt. M5) • $371,520 (Alt. M6) • No long-term monitoring included for Alt. M7)	Lump Sum	Assumes 6 monitoring events in years 1, 3, 5, 10, 15, and 30. Based on recent project experience, costs for each alternative include: • Physical Integrity monitoring: $10,000 per event (caps only) • EMNR/MNR sediment quality monitoring: $1,600/acre each event • Engineered cap sediment quality monitoring: $6,600/acre each event • Cap maintenance and repair: $2,000/acre

Table N-2
Area and Volume Assumptions

Element	Assumption	Source and/or Comment
Conversion between tons and cubic yards, sediment and sand	1.5 tons per cubic yard	Typical assumption for silty and sandy sediments (EMNR material, and backfill material)
EMNR cover thickness	6-inch-thick sand layer	Nominal 6-inch-thick layer with a 6-inch over-placement tolerance
Engineered cap thickness	2-foot-thick layer	Volume increased by 0.5 foot for losses and over-placement tolerance
Backfill	Varies	Equal to dredge volume
Dredging neat line thickness	Varies	Assumed overall average; volume increased by 2% scaling factor based on recent USEPA and USACE guidance
Dredging over-depth allowance thickness	0.25 foot	No scaling factor applied

Table N-3

Summary of Alternative Costs

Task	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative7
Mobilization and Demobilization	$ 300,000	$ 300,000	$ 300,000	$ 500,000	$ 500,000	$ 500,000	$ 900,000
Site Preparation	$ 1,040,000	$ 1,040,000	$ 1,110,000	$ 1,110,000	$ 1,110,000	$ 1,110,000	$ 1,110,000
Enhanced Natural Recovery	$ -	$ 599,638	$ 599,638	$ 599,638	$ 561,523	$ 599,638	$ -
Dredging and Disposal	$ -	$ -	$ 1,828,438	$ 2,476,164	$ 3,949,980	$ 4,485,198	$ 17,776,576
Engineered Cap/Backfill	$ -	$ 795,582	$ 795,582	$ 795,582	$ 1,015,686	$ 1,096,686	$ 4,653,374
Environmental Controls	$ -	$ 100,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 100,000
Bathymetric Surveys	$ 20,000	$ 140,000	$ 180,000	$ 200,000	$ 200,000	$ 200,000	$ 90,000
Subtotal Construction Costs	**$ 1,360,000**	**$ 2,975,220**	**$ 5,013,659**	**$ 5,881,385**	**$ 7,537,189**	**$ 8,191,523**	**$ 24,629,950**
Construction Contingency & WSST	**$ 537,200**	**$ 1,175,212**	**$ 1,980,395**	**$ 2,323,147**	**$ 2,977,190**	**$ 3,235,652**	**$ 9,728,830**
Total Construction Cost	$ 1,897,200	$ 4,150,433	$ 6,994,054	$ 8,204,532	$ 10,514,379	$ 11,427,175	$ 34,358,780
Pre-Design Sampling	$ -	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000
Project Management	$ 97,802	$ 97,802	$ 239,723	$ 276,824	$ 313,115	$ 324,003	$ 794,544
Engineering and Design	$ 94,860	$ 207,522	$ 349,703	$ 410,227	$ 525,719	$ 571,359	$ 1,717,939
Permitting	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Construction Management Support	$ 104,074	$ 210,921	$ 255,098	$ 294,577	$ 333,196	$ 344,782	$ 845,501
Environmental Monitoring During Construction	$ 79,914	$ 161,958	$ 195,878	$ 226,193	$ 255,847	$ 264,743	$ 649,224
Verification Sampling	$ -	$ -	$ 25,000	$ 29,000	$ 25,000	$ 29,000	$ 166,000
Institutional Controls	$ -	$ 47,850	$ 47,850	$ 47,850	$ 7,755	$ -	$ -
Long-Term Monitoring	$ 399,360	$ 581,160	$ 581,160	$ 581,160	$ 471,960	$ 371,520	$ -
Habitat Mitigation Costs							
Total Non-Construction Cost	**$ 876,009**	**$ 1,707,620**	**$ 1,994,412**	**$ 2,165,831**	**$ 2,232,592**	**$ 2,205,407**	**$ 4,473,208**
Total Cost	**$ 2,773,209**	**$ 5,858,053**	**$ 8,988,466**	**$ 10,370,363**	**$ 12,746,971**	**$ 13,632,582**	**$ 38,831,988**

Table N-4

Alternative M1 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	0	$ -
Prepare upland staging (no dredging)	$ 80,000	LS	1	$ 80,000
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	0	$ -
Place 12-inch thick Silty Sand Material	$ 30	TON	0	$ -
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	0	$ -
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	0	$ -
Dredge material dewatering and treatment	$ 12,500	Monthly	0	$ -
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	0	$ -
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	0	$ -
Bathymetric/Topographic Surveys	$ 10,000	LS	2	$ 20,000
Subtotal Direct Construction Costs				$ 1,360,000
Contingency	30%	Percent		$ 408,000
WSST	9.5%	Percent		$ 129,200
Total Direct Construction Cost				$ 1,897,200
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	0	$ -
Project Management	$ 42,100	Monthly	2.3	$ 97,802
Engineering and Design	$ 94,860	LS	1	$ 94,860
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	2.3	$ 104,074
Environmental Monitoring During Construction	$ 34,400	Monthly	2.3	$ 79,914
Verification Sampling	$ 10,000	LS	0	$ -
Institutional Controls	$ 16,500	Acre	0	$ -
Long Term Monitoring	$ 399,360	LS	1	$ 399,360
Total Indirect Construction Costs				$ 876,009

Table N-4
Alternative M1 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 2,773,209**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	0	TONS	0
Temporary Shoring	40	0	LF	0
Dredging - Land Based Equipment	500	0	CY	0
Place Backfill Material	1200	0	TONS	0
Place Engineered Cap Material	600	0	Tons	0
Total Duration				2.3

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-5
Alternative M2 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	0	$ -
Prepare upland staging (no dredging)	$ 80,000	LS	1	$ 80,000
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	0	$ -
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	0	$ -
Dredge material dewatering and treatment	$ 12,500	Monthly	0	$ -
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	0	$ -
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17680	$ 530,388
Environmental Controls	$ 100,000	LS	1	$ 100,000
Bathymetric/Topographic Surveys	$ 10,000	LS	14	$ 140,000
Subtotal Direct Construction Costs				$ 2,975,220
Contingency	30%	Percent		$ 892,566
WSST	9.5%	Percent		$ 282,646
Total Direct Construction Cost				$ 4,150,433
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000.00
Project Management	$ 42,100	Monthly	4.7	$ 198,210
Engineering and Design	$ 207,522	LS	1	$ 207,522
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	4.7	$ 210,921
Environmental Monitoring During Construction	$ 34,400	Monthly	4.7	$ 161,958
Verification Sampling	$ 10,000	LS	0	$ -
Institutional Controls	$ 16,500	Acre	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,707,620

Table N-5
Alternative M2 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 5,858,053**
	Daily Rate	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13325.29838	TONS	1.0
Temporary Shoring	40	0	LF	0
Dredging - Land Based Equipment	500	0	CY	0
Place Backfill Material	1200	0	TONS	0
Place Engineered Cap Material	600	17680	Tons	1.4
Total Duration				4.7

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-6
Alternative M3 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	1	$ 150,000
Prepare upland staging (no dredging)	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	10,682	$ 373,885
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	10,682	$ 53,412
Dredge material dewatering and treatment	$ 12,500	Monthly	5.7	$ 71,177
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	16,024	$ 1,329,964
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000.00
Bathymetric/Topographic Surveys	$ 10,000	LS	18	$ 180,000
Subtotal Direct Construction Costs				$ 5,013,659
Contingency	30%	Percent		$ 1,504,098
WSST	9.5%	Percent		$ 476,298
Total Direct Construction Cost				$ 6,994,054
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	5.7	$ 239,723
Engineering and Design	$ 349,703	LS	1	$ 349,703
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	5.7	$ 255,098
Environmental Monitoring During Construction	$ 34,400	Monthly	5.7	$ 195,878
Verification Sampling	$ 10,000	LS	2.5	$ 25,000.0
Institutional Controls	$ 16,500	Acre	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,994,412

Table N-6
Alternative M3 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 8,988,466**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13325.29838	TONS	1
Temporary Shoring	40	0	LF	0
Dredging - Land Based Equipment	500	10,682	CY	1
Place Backfill Material	1200	0	TONS	0
Place Engineered Cap Material	600	17680	Tons	1.4
Total Duration				5.7

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-7
Alternative M4 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	12,729	$ 445,526
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	12,729	$ 63,647
Dredge material dewatering and treatment	$ 12,500	Monthly	6.6	$ 82,192
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	19,094	$ 1,584,799
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 5,881,385
Contingency	30%	Percent		$ 1,764,415
WSST	9.5%	Percent		$ 558,732
Total Direct Construction Cost				$ 8,204,532
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	6.6	$ 276,824
Engineering and Design	$ 410,227	LS	1	$ 410,227
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	6.6	$ 294,577
Environmental Monitoring During Construction	$ 34,400	Monthly	6.6	$ 226,193
Verification Sampling	$ 10,000	Acre	2.9	$ 29,000
Institutional Controls	$ 16,500	LS	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 2,165,831

Table N-7

Alternative M4 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 10,370,363**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	12,729	CY	1.2
Place Backfill Material	1200	0	Tons	0
Place Engineered Cap Material	600	17,680	Tons	1.4
Total Duration				6.6

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-8

Alternative M5 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	12,478	$ 187,174
Place 12-inch thick Silty Sand Material	$ 30	TON	12,478	$ 374,349
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	21,623	$ 756,811
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	21,623	$ 108,116
Dredge material dewatering and treatment	$ 12,500	Monthly	7.4	$ 92,968
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	32,435	$ 2,692,085
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	29,592	$ 443,878
Place Backfill Material	$ 15	TON	29,592	$ 443,878
Purchase & Transport Engineered Cap Material	$ 15	TON	2,843	$ 42,643
Place Engineered Cap Material	$ 30	TON	2,843	$ 85,286
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 7,537,189
Contingency	30%	Percent		$ 2,261,157
WSST	9.5%	Percent		$ 716,033
Total Direct Construction Cost				$ 10,514,379
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	7.4	$ 313,115
Engineering and Design	$ 525,719	LS	1	$ 525,719
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	7.4	$ 333,196
Environmental Monitoring During Construction	$ 34,400	Monthly	7.4	$ 255,847
Verification Sampling	$ 10,000	Acre	2.5	$ 25,000
Institutional Controls	$ 16,500	LS	0.47	$ 7,755
Long Term Monitoring	$ 471,960	LS	1	$ 471,960
Total Indirect Construction Costs				$ 2,232,592

Table N-8
Alternative M5 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 12,746,971**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	12,478	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	21,623	CY	2.0
Place Backfill Material	1200	32,435	Tons	1.2
Place Engineered Cap Material	600	2,843	Tons	0.2
Total Duration				7.4

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-9
Alternative M6 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	24,371	$ 852,978
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	1	$ 80,000
Sediment stockpiling	$ 5	CY	24,371	$ 121,854
Dredge material dewatering and treatment	$ 12,500	Monthly	8	$ 96,200
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	36,556	$ 3,034,166
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	36,556	$ 548,343
Place Backfill Material	$ 15	TON	36,556	$ 548,343
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 8,191,523
Contingency	30%	Percent		$ 2,457,457
WSST	9.5%	Percent		$ 778,195
Total Direct Construction Cost				$ 11,427,175
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	7.70	$ 324,003
Engineering and Design	$ 571,359	LS	1	$ 571,359
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	7.70	$ 344,782
Environmental Monitoring During Construction	$ 34,400	Monthly	7.70	$ 264,743
Verification Sampling	$ 10,000	Acre	2.9	$ 29,000
Institutional Controls	$ 16,500	LS	0	$ -
Long Term Monitoring	$ 371,520	LS	1	$ 371,520
Total Indirect Construction Costs				$ 2,205,407

Table N-9
Alternative M6 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				**$ 13,632,582**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	24,371	CY	2.2
Place Backfill Material	1200	36556.21258	Tons	1.4
Place Engineered Cap Material	600	0	Tons	0.0
Total Duration				7.7

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-10
Alternative M7 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	4	$ 800,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	0	$ -
Place 12-inch thick Silty Sand Material	$ 30	TON	0	$ -
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	103,408	$ 3,619,291
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	900	$ 450,000
Dredging - Excavation Dewatering	$ 80,000	LS	1	$ 80,000
Sediment stockpiling	$ 5	CY	103,408	$ 517,042
Dredge material dewatering and treatment	$ 12,500	Monthly	19	$ 235,910
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	155,112	$ 12,874,334
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	155,112	$ 2,326,687
Place Backfill Material	$ 15	TON	155,112	$ 2,326,687
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	1	$ 100,000
Bathymetric/Topographic Surveys	$ 10,000	LS	9	$ 90,000
Subtotal Direct Construction Costs				$ 24,629,950
Contingency	30%	Percent		$ 7,388,985
WSST	9.5%	Percent		$ 2,339,845
Total Direct Construction Cost				$ 34,358,780
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	18.9	$ 794,544
Engineering and Design	$ 1,717,939	LS	1	$ 1,717,939
Permitting	$ 100,000	Acre	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	18.9	$ 845,501
Environmental Monitoring During Construction	$ 34,400	Monthly	18.9	$ 649,224
Verification Sampling	$ 10,000	Acre	16.6	$ 166,000
Institutional Controls	$ 16,500	LS	0	$ -
Long Term Monitoring	$ -	LS	1	$ -
Total Indirect Construction Costs				$ 4,473,208

Table N-10
Alternative M7 Cost Estimate

Grand Total Cost (Total Direct + Total Indirect)				$ 38,831,988
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	0	TONS	0.0
Temporary Shoring	40	900	LF	1.0
Dredging - Land Based Equipment	500	103,408	CY	9.5
Place Backfill Material	1200	155112	Tons	6.0
Place Engineered Cap Material	600	0	CY	0.0
Total Duration				18.9

Notes:

LF: Linear Foot

CY: Cubic yard

Ea: Each

LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

APPENDIX O

CORRESPONDENCE WITH ECOLOGY

Description: Contains the Ecology comment documents and associated JELD-WEN comment response documents for the previously submitted draft versions of the RI/FS that used in the development of the final RI/FS document.

June 19, 2020; Ecology email with Comments on the 2020 Revised Draft RI/FS and Attachments for Ecology Recommended Alternatives.

R. Scott Miller

From: Alam, Mahbub (ECY) <MALA461@ECY.WA.GOV>
Sent: June 19, 2020 5:23 PM
To: Dwayne Arino (Darino@jeldwen.com)
Cc: R. Scott Miller; Nathan Soccorsy; Edwards, Susannah (ECY); Adolphson, Peter (ECY)
Subject: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study [Site Name: JELD-WEN, Inc.; FSID: 2757]
Attachments: EcologyCommentsJW-RIFS20200619.pdf; DRAFT_T10.1-1_Creosote Area DCA_EcyEdited.xlsx; DRAFT_Appendix M_Creosote Area Remediation Costs_EcyEdited.xlsx; Pages from Attachments_ 06-07-2017-email response to DraftRIFS discussion.pdf; 5. Table 10.2-1_May_2020_EcyEdited.xlsx; 7. Tables N.3 through N.12_JELD WEN Cost Estimates_May_2020_EcyEdited.xlsx; DRAFT 2020 Revised RIFS Report_Jeld Wen Former Nord Door Facility_043020_EcyEdits&Comments.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Re: Site Name: JELD-WEN, Inc.; FSID: 2757

Hi, Dwayne:
Attached find Ecology's comments on the 2020 revised draft RI/FS for the JELD-WEN site (FSID: 2757).
Ecology appreciates JELD-WEN's efforts that went into production of the 2020 revised draft document. It appears Ecology and JELD-WEN has some differences in the recommended cleanup technology for both upland and marine cleanup. Along with this comment submittal, Ecology has proposed recommended alternatives for both upland and marine areas that we believe are most permanent to the extent practicable. These alternatives do not employ new technology but they have been tweaked from the alternatives submitted by JELD-WEN in the RI/FS document. JELD-WEN will revise the RI/FS document based on Ecology recommended alternatives.
The following attachments are provided with this email.

1. Technical memo describing Ecology Comments on the RI/FS document (pdf file)
2. Ecology edited upland creosote/fuel oil impact area DCA matrix and analysis (excel file)
3. Ecology edited upland creosote/fuel oil impact area cost estimate (excel file)
4. Cross-section of creosote/fuel oil area showing mass removal (pdf file)
5. Ecology edited marine area DCA matrix and analysis (excel file)
6. Ecology edited marine area cost estimate (excel file)
7. Redline RI/FS text document showing Ecology edits and comments (pdf file)

Agreed Order provides 15 days for comment incorporation. As such, a Draft Final version of the RI/FS document incorporating all comments is due to Ecology on July 06, 2020. However, given these are substantive comments, Ecology will consider a longer time for comment incorporation. JELD-WEN will request for any time extension for comment incorporation by Friday, June 26.

Ecology is available to meet on teleconference, if there are any questions or concerns. Let me know as soon as possible, if you would like a meeting.
Thank you for your continued cooperation on this project.

Sincerely,

Mahbub Alam, PhD, PE
Environmental Engineer, Toxics Cleanup Program
Department of Ecology
PO Box 47600, Olympia, WA 98504-7600

DEPARTMENT OF ECOLOGY

Toxics Cleanup Program

TO: Dwayne Arino, P.E., JELD-WEN, Inc.

FROM: Mahbub Alam, PhD, PE, Cleanup Project Manager

DATE: June 19, 2020

SUBJECT: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study
Site Name: JELD-WEN, Inc.; FSID: 2757

Name of Document	2020 Revised Draft Remedial Investigation/Feasibility Study
Date	April 2020
Owner	JELD-WEN, Inc.
Prepared By	SLR International Corporation and Anchor QEA, LLC
Reviewed By	Mahbub Alam, PhD, PE Susannah Edwards

Ecology would like to thank JELD-WEN for submitting the 2020 revised Remedial Investigation/Feasibility Study (RI/FS) on April 30, 2020. Ecology has reviewed the document per the requirements of Model Toxics Control Act (MTCA) regulation 173-340 WAC and Sediment Management Standards (SMS) regulation 173-204 WAC. The following are Ecology's comments.

Upland Section Comments

1. Upland FS Alternatives (Woodlife Area)

For the Woodlife Area contaminated with Dioxins and Furan (D/F), Ecology agrees with the recommended Alternative 2 that proposed to remove most impacted soil. This Alternative will excavate 0 to 5 feet bgs (below ground surface) over an approximately 22,000 square feet area. However, this removal will not result in achieving cleanup level after construction as the precise depth and area of contamination have not been clearly established through RI sampling. For example, at GP-501, the concentration of D/F was 115 ppt at 5 feet (One of the only two 5 feet deep sample). No information beyond 5 feet bgs is available. Remedial design (RD) sampling could be used to limit the area and depth of excavation during design.

In addition, it is not clear why excavation boundary does not include GP-512 area, which measured 114 ppt at 1' depth. This area may be within the Port of Everett (Port) Bay Wood site. Jeld-Wen needs to cleanup the Site contamination regardless of property ownership. Jeld-Wen is encouraged to coordinate with the Port for cleanup in the Area. Note that the Port is conducting an interim action in that area (the Area that received discharge from North Truck Bay Sump) to remove D/F contaminated soil. It would be beneficial to coordinate with Bay Wood's interim action project.

Since some contamination will be left in place and institutional and engineering control including monitored natural attenuation (MNA) will be used, it is necessary to establish a remediation level (REL) for D/F. Confirmation sampling values (side-wall and depth) post-excavation will be compared against the REL. Using the REL approach, it may not be necessary to excavate up to 5 feet in all areas. However, at some locations, depending on the results of confirmation sampling, deeper excavations may be necessary. A REL based on 5X above D/F cleanup level (26 ppt) can be used at this location.

2. Upland FS Alternatives (Creosote/TPH Area)

Ecology does not agree with JELD-WEN's recommended Alternative 2 of *in-situ* bioremediation (ISB) with sub-slab depressurization (SSD) as the most protective and permanent cleanup for the area. As a cleanup technology, ISB involves a great deal of uncertainty and may not work well with free phase products. Ecology believes excavation of contaminated soil and off-site disposal/ex-situ treatment to the extent practicable is the most permanent and protective cleanup for this site. Soil removal with offsite disposal will also be consistent with cleanup of other nearby cleanup sites in the Port Gardner Bay including recent directives with Exxon Mobil and Kimberly Clark Worldwide site.

To move this RI/FS forward, Ecology developed an Alternative, which is a hybrid between Alternative 2 and 4. This new Ecology Alternative 7 will involve excavation of approximately 12,000 cu yard of on-property shallow soil about 9 feet bgs and off-site disposal. Jeld-Wen can opt for *ex-situ* treatment and reuse the soil onsite, after meeting the remediation level. This excavation volume is based on removal of 85% of contaminant mass found through soil boring and chemistry data (SLR provided this data about 3 years ago and the data are attached to this tech memo). This hotspot area soil removal will be followed by ISB, SSD, and MNA. Ecology believes ISB may work best after hotspots are removed or treated *ex-situ*. The revised DCA matrix with cost estimate spreadsheet is attached with this tech memo. Jeld-Wen is expected to take this narrative explanation and the benefit scores Ecology provided in the Disproportionate Cost Analysis (DCA) matrix and change/modify the language in the text of respective FS alternatives section.

Since contamination will be left in place, it is necessary to establish a REL. Per MTCA, RELs may be defined as concentration or other methods of identification. For the Creosote/TPH area, it may be practical to establish REL based on physical characteristics of the soils (for example, no visual free product, no staining/color, no odor, and PID reading below certain threshold).

3. Eligible Remedial Action Cost

FS Alternative 4 in upland creosote/TPH area described a building reconstruction cost of $5.2 M plus. Building reconstruction is not an eligible remedial action cost unless it is necessary for the remedy to work. Ecology determined this cost is not eligible remedial action cost and must be removed from cost estimates.

4. Preliminary cleanup level (PCL)

Ecology has coordinated with SLR on PCL tables after the RI/FS submittal. Per our Agreement, revise the PCL Table and all other data Tables to reflect the revised PCL values

5. Ground Water to Surface Water Pathway & CSM

At several locations of the document, it is stated that there is no migration or transport of COCs to marine environment. As Ecology provided in earlier comments on this issue and discussed in detail with SLR, the RI/FS text needs to change based on the following narrative.

The ground water to surface water pathway is complete based on detections of upland COCs in shoreline wells, however, this does not appear to be any concern to surface water or sediment since some COCs detection are sporadic (below PQL) and TPH are below PCL.

Marine Section Comments

6. Alternatives Scoring Process for the Marine Area

Scoring Process

Thank you for providing detailed information in the April 2020 Draft RI/FS Report that explains JELD-WEN's alternatives scoring process. After reviewing the 2016 Draft Final RI/FS Ecology requested that JELD-WEN provide a more transparent process within the document so we could understand how scores were assigned to each of the alternatives. In particular, Ecology requested that JELD-WEN provide a description of risk reduction, and potential for future re-exposure or releases for each alternative. We suggested the Port Gamble Upland Mill Site Draft FS Report could be referred to as an example of a recent report that included such information. After reviewing the April 2020 submittal, however, Ecology has identified some significant concerns regarding the scoring process.

First, to fully understand Ecology's concerns, it is important to note that the Sediment Management Areas (SMAs) are defined in the FS by contaminant concentrations in the top 1 foot of sediment (the preliminary point of compliance). SMA-3 contains sediment with the highest concentrations of PCBs and/or dioxins/furans (dioxin) and greatest cleanup level exceedances for those contaminants. SMA-3 encompasses the smallest area of the Site (2.9 acres). SMA-2 is based on the dioxin concentration protective of direct contact for humans, and on an area and concentration that if remediated in addition to SMA-3 achieves the site-wide human health-based cleanup level for PCBs. All of SMA-2 exceeds cleanup levels for either PCBs or dioxin. SMA-2 encompasses the second largest area of the Site (5.5 acres). SMA-1 contains the lowest comparative concentrations of dioxins and PCBs, however, concentrations of both contaminants exceed cleanup levels in SMA-1. SMA-1 encompasses the largest area of the Site (8.2 acres).

Ecology has outlined below our concerns with the fundamental logic developed by JELD-WEN to score the marine alternatives:

I. For each of the six MTCA alternatives scoring criterion, various technologies were scored based on their effectiveness at meeting the criteria within each Sediment Management Area (SMA). (The six criteria are permanence, protectiveness, long-term effectiveness, management of short-term risks, technical and administrative implementability and consideration of public concerns.) The effectiveness of each technology at meeting the criterion within each SMA was evaluated independently of actions taken in other SMAs. For example, Monitored Natural Recovery (MNR) was assigned a 10 in meeting the permanence criterion in SMA-1, regardless of whether the technology selected for SMA-2 was also MNR, or if it was something much more permanent, such as full removal. This is inconsistent with MTCA (WAC 173-340-360). Adding to our confusion, JELD-WEN scored MNR as the most permanent action evaluated for SMA-1, even more permanent than full removal. Removal or destruction typically provide greater environmental benefit than other technologies, which keep contaminants on-site regardless of any SMA designation. The scores for each technology were then added together to develop the overall score for each alternative. This disconnected scoring process does not take into account the interactions between various remedial technologies for a given alternative.

   The alternatives should be scored holistically based on how well each criterion is met with the unique combination of technologies selected for each alternative.

II. The scoring template incorporated area-weighting. The technology score assigned to each SMA was multiplied by the area in which the technology would be used. That is, the most weight was given to actions in SMA-1 because it encompasses the largest area, regardless of the fact that it contains lower concentrations than SMA-2 or SMA-3. The least amount of weight was given to actions in SMA-3 despite the fact that SMA-3 contains the highest level of cleanup level exceedances. This approach devalued any hotspot/mass removal. Again, this is inconsistent with the intent and purpose of the disproportionate cost analysis and MTCA. Ecology prioritizes mass destruction or removal over leaving contaminants in place, as it is viewed as providing the greatest environmental benefit with the most permanent cleanup.

The flawed outcome of the technology-based and area-weighted scoring process is demonstrated clearly by the fact the no action alternative (M-1) resulted in a score of 5.4 in the residual risk category (a sub category of permanence) and a total weighted benefits score of 7.2 out of 10. Ecology is not assigning any score to this alternative because it does not meet the minimum requirements for cleanup actions (173-340-360(2) WAC). Another example: For the residual risk (mass removal) subcriterion, M-2, an alternative that does not include any permanent destruction or removal of contaminated sediment from the site received a score of 8.4. Alternative M-8, which results in removal of all sediment above cleanup levels received a score of 9.0. The scoring process results in a similarly small spread of benefits scores for many of the criteria, despite substantial differences in remedial actions selected across the range of alternatives. This scoring process clearly undervalues more effective, permanent cleanups.

Ecology Revisions

For the reasons stated above, Ecology revised the narrative for each alternative within the scoring template provided (Table 10.2-1), and has rescored each alternative using the revised narrative. Ecology removed the area-weighting factor as well as the technology-based scoring process. Instead, we scored each alternative by evaluating the combined impact of remedial actions in SMA-1, SMA-2, and SMA-3 for each alternative. This scoring is both consistent with MTCA (WAC 173-340-360) and with numerous other cleanups conducted throughout the state. While JELD-WEN's scoring resulted in nearly identical total weighted benefits scores for Alternatives M-2 through M-7, Ecology's scoring process resulted in a larger spread of benefits scores and reflect the risk reduction and increased certainty achieved by successively more permanent cleanup options. Alternatives that included removal and upland disposal of contaminated sediment were generally assigned greater benefits (with the exception of the short-term risk category) relative to those that relied on in-place containment of contaminated sediment. This is most apparent in the long-term effectiveness category, consistent with WAC 173-204-570(4). We did not score M-1 as it does not meet MTCA/SMS minimum requirements (i.e. it is not protective of human health and the environment, cleanup standards will not be met within a reasonable timeframe, it is not permanent to the maximum extent practicable).

It's important also to note that the boundaries of the sediment management areas are defined by cleanup level exceedances within the preliminary point of compliance (the top 1 foot – which is the biologically active zone). It is critical to understand, however, that contaminants exceeding cleanup levels are also present below the top 1 foot in some areas. These deeper exceedances can often pose on-going and potential future risks to humans and wildlife even if the sediment within the point of compliance is remediated and initially meets cleanup levels (e.g. erosion, climate change impacts, upward contaminant migration, and seismic events are examples of forces that may result in exposure).

Preferred Alternative Analysis

Based on Ecology's revised scores, Alternative 7 provides the greatest benefits, Alternative 8 provides the second greatest benefits, and Alternative 6 the third greatest benefits. Alternatives 6 and 7 cost/benefit ratio are not disproportionate to less costly alternatives evaluated.

Upon further review of Alternatives 6 and 7, Ecology has identified a hybrid alternative that further increases benefits without being disproportionately more costly. This alternative includes full removal of contaminants in SMA-3 south side, and a 2-foot removal in SMA-3 inlet. Full removal in SMA-3 south side results in a reduced need for long-term maintenance and monitoring of that area. Long-term maintenance and monitoring costs are expected to be substantially reduced compared to alternatives that rely heavily on engineered capping. The alternative also includes greater removal of sediment contaminated with PCBs above the cleanup level in the knoll area (i.e. an additional 0.35 acres removing some areas below the benthic cleanup level but above the human-health based cleanup level). This alternative will result in reduced risk of a pathway to the upland groundwater as had been identified in the upland RI. Ecology anticipates the additional removal will further reduce risks to overlying surface water as well. This approach is consistent with the statement in the Upland FS that *cleanup of knoll fill area groundwater contamination for PCBs will be addressed by the marine cleanup selected alternative* (Section 8.4.3).

The details of this hybrid alternative are:

- Removal and engineered cap: 0.47 acres x 2 foot depth (SMA-3 inlet)

- Removal and backfill: 1.9 acres x 4 foot depth (SMA-3 south side)
- Removal and backfill: 0.9 acres x 2 foot depth (SMA-3 knoll and partial SMA-2 knoll of approximately 0.35 acres)
- EMNR: 5.2 acres
- MNR: 8.2 acres

The cost for this alternative is estimated to be $12.7 M. The revised DCA matrix with narrative and cost estimate are attached to this tech memo. Jeld-Wen will take this narrative and make appropriate changes in the FS.

7. Long-Term Maintenance and Monitoring Costs

In Ecology's experience long-term maintenance and monitoring costs can be substantial depending on the level of contamination left in place, and site-specific factors such as erosional forces. It was difficult to assess the long-term maintenance and monitoring costs (LTMM) as they were presented as a lump sum under "Long-Term Maintenance" in the cost spreadsheet. However, we noticed these costs did not differ greatly for many of the alternatives. These costs may differ more greatly between alternatives depending on assumptions made regarding length of LTMM, and whether the alternative includes an engineered cap-on-grade vs a removal and engineered cap. Additionally, it is not apparent if costs associated with permanent land-use restrictions were considered.

Other Comments

8. Redline word document file

Ecology attached a redline word document that contains comments, edits, questions. Jeld-Wen will incorporate these edits and provide response to these edits/comments/questions, as necessary. Provide a redline version of the document to show how these edits/comments were incorporated in the next version of the document.

9. Figure Heading Text and Reference

Several Figures in section 5 (e.g., Figure 5.2-10 has the term "CSM" in Figure title). This Figure is not a conceptual site model (CSM) as CSM Figure has special requirement. Remove the term CSM from these Figures. In addition, there appears to be incorrect Figure references in the text. Check/correct all the Figure references in the text.

10. Cross-sectional Figure

Figure 5.2.4-1 and 5.2.4-2 shows cross-section data from different boring. It is necessary to show the cross-section line (AA' or BB') in a plan map showing all the boring locations.

11. REL Vs. RAL

Figure 6.2-1 and Figure 6.2-2 shows both REL and RAL. RAL is referenced at bottom next to SWAC. In addition, several areas of the text used Remedial Action Level (RAL) term. While RAL and Remediation Level (REL) are similar, RAL is used in Federal cleanup rules whereas REL is used in MTCA. Remove the term RAL and use consistent term REL per MTCA throughout the document.

Table 10.1-1
Creosote Area
Disproportional Cost Analysis Matrix

Criterion	Weighting	WAC Language	Scoring Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
				Sub-Slab Depressurization (SSD), Engineering Control (EC), Institutional Controls (IC)	In-Situ Bioremediation (ISB), SSD, MNA, EC, IC	In-Situ Chemical Oxidation (ISCO), SSD, MNA, IC	Soil Removal, ISB, MNA, IC	Thermal Treatment (TT), SSD, EC, IC	In-Situ Soil Stabilization/Solidification (ISS), TT, IC	Hotspot Soil Removal, ISB, MNA, IC
Protectiveness	30%	Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.	Protection of human health and the environment is a threshold requirement. Alternative 1 does not meet MTCA minimum requirement for cleanup actions and therefore is not scored. Alternative 2 through 7 protects human health and environment by reducing the existing risk. Alternative 4 and 7 scores highest due to the greater degree of certainty associated with removal and the quicker risk reduction. Alternative 4 scores higher than 7 because of more contaminant mass removal resulting in shorter restoration timeframe. Alternative 6 reduces the mobility of contaminants but leaves them in place and removes contamination through thermal treatment from off property areas. Alternatives 2, 3, and 5 treat the majority of contamination from the Site with different degree of certainty and restoration timeframe with thermal treatment (Alternative 5) scores relatively higher being more effective and shorter restoration timeframe. Alternative 2 suffers from lesser degree of certainty and requires more active treatment time than alternative 5 and therefore scores lower among these. Alternative 3 addresses on property contamiantion but does not address off property contamination and therefore scores the lowest.							
			Score:		4.0	3.0	10.0	6.0	7.0	9.0
Permanence	20%	The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.	Alternatives are scored based on permanent removal of contaminants with higher scoring provided for alternatives that permanently reduce toxicity, mobility or volume. Alternative 1 is not scored as it does not meet minimum MTCA requirement for cleanup actions. Alternatives 4, 5 and 7 permanently remove or treat the majority of contamination on the Site. Alternative 4 and 7 removes most on-site contamination permanently and scores the highest. Alternative 4 scores slightly higher than 7 because of more soil mass removal resulting in more permanent solution. Alternative 5 provides more complete treatment of the volatile and semivolatile contaminants and therefore scores the next highest. Alternatives 2 and 6 also provide treatment or immobilizes contaminant but Alternative 2 is not very effective on higher ring PAHs. Alternative 6 scores higher due to the thermal treatment of the off property areas. Alternative 3 scores lowest as it leaves most contamination on off property soils.							
			Score:		4.0	3.0	9.0	7.0	6.0	8.0
Long-Term Effectiveness	20%	Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.	Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex & less reliable treatment technologies and technologies requiring longer durations generally are ranked lower. Scores reflect MTCA's preferences for (in order) recycling, destruction/detoxification, immobilization/solidification, off-site disposal, isolation/containment, and institutional and engineering controls. Alternative 1 is not scored as it does not meet minimum MTCA requirement for cleanup actions. Alternative 4, 5, and 7 have simiar higher scores for long term effectives than other alternative. Alterntiave 5 could score very high due to more complete destruction of hazardous substances on Site but some degree of uncertainty exists whether this Alternative will be successful. Alternative 4 and 7 relies on off-site disposal which is a mature and proven technology used at most sites with Alternative 4 scoring slightly higher than 7 because of less magnitude of residual risk remaining on-site. Alternative 6 also scores very high due to immobilization and destruction technology but suffers from complexity. Alternatives 2 destroy contamination over a longer period that requires longer monitored natural attenuation. Reliability and the certainty of the technology to achieve cleanup level is slow and questionable. Alternative 3 also destroys contaminant quicker than Alternative 2 but it is not practical for off-property contamination and therefore receives the lowest score.							
			Score:		4.0	3.0	9.0	8.0	7.0	8.0
Management of Short-Term Risk	10%	The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.	Scoring for management of short term risks uses a relative scale to evaluate construction risks to human health and safety; larger more complex projects are considered to carry greater risk than simpler small projects. Technology-specific risks have been considered (e.g. thermal treatment has temperature related risks, excavation has cave-in, heave, and shoring risks, ISCO has chemical handling risks, etc.). If effective measures can be taken to minimize the risks, it will score relatively higher. Alternative 1 does not meet MTCA minimum requirement for cleanup actions and therefore is not scored. Alternative 2 includes modest installation risks for the enhanced bioremediation system (pumps and pipings) and operated for a longer period of time (cumulative health and safety consideration). This Alternative still receives the highest score comparing to other Alternative's construction risk. Alternative 3 ISCO treatment poses an elevated risk of worker injury handling and injecting high-ionic strength solution, as well as potential risk to near-surface utilities. Alterntnatives 4, 5, 6, and 7 can pose some short term risks that include high risks of worker injury that may include excavation failures, potentail burns or damage associated with high pressure steam, injuries associated with building demolition, and/or damage to near surface utilities. Therefore, these Alternatives score lower compared to Alternative 2. However, measures							
			Score:		8.0	7.0	4.0	6.0	4.0	5.0
Technical and Administrative Implementability	10%	Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.	Scoring evaluates the overall difficulty of implementation each of the proposed alternatives. Alternative 1 is not scored as it does not meet minimum MTCA requirement for cleanup actions. Alternative 2, 3, 4, 5 and 7 are readily implementable with some degree of differences and score similar points. Alternatives 2, 3, & 5 use technologies that have been demonstrated to be effective for conditions observed at the Site and comprise projects of moderate size and complexity. Alternative 2 requires more active services while Alternative 3 requires chemical amendments that have become more difficult to procure and handle at the scale required for treatment. Alternative 5 also uses mature techology that has demonstrated efficacy at the Site, but may require a greater degree of complexity to construct and execute. Alternatives 4 and 7 represent proven technology (frequenly occuring) with available offsite facilities for disposal. Alternative 7 is less invasive than Alternative 4 and, therefore, scores slightly higher. Alternative 6 requires extensive, high-risk construction and therefore scores the lowest.							
			Score:		8.0	7.0	6.0	7.0	4.0	7.0
Consideration of Public Concerns	10%	Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.	Alteranatives were scored based on what public desires for cleanup in the area as commensurate with oth cleanups in the Port Gardner Bay. Alternative 1 does not meet MTCA minimum requirement for cleanup actions and therefore is not scored. Alternative 4 and 7 offer confirmatory removal of contamination from public's backyard with minor impact (active construction, hauling to offsite facilities) and therefore score highest from public point of view. Alternatives 2 and 5 offer active cleanup of contamination on Site with the least potential public impact, however, public are skeptical about biological treatment. Alternative 6 scores lowers than previous alternatives due to greater public impacts including keeping contamination in place, extended construction schedules and prolonged disruption to business activity on the Subject Property. Alternatives 3 scores the lowest based on public concern about injection of chemicals in groundwater and leaves contamination off property.							
			Score:		5.0	3.0	9.0	6.0	4.0	8.0
			Total Composite Benefit Score:		4.9	3.8	8.5	6.7	5.9	7.9
			Unit Cost (Dollars per Composite Benefit Score Increment):		$1,123,000	$2,079,000	$1,730,000	$1,762,000	$2,882,000	$950,000
			Cost (Millions of Dollars):		$5.5	$7.9	$14.7	$11.8	$17.0	$7.5
			Benefit Score to Cost Ratio		0.9	0.5	0.6	0.6	0.3	1.1

Creosote Area - Alternative 7

Hotspot Soil Removal (on-property) and Bioremediation on- and off-property

Excavation and off-site disposal of contaminated on-property soil to 9 feet bgs and Bioremediation (Bio) on- and off-property

Based on x-section figure 5.2.4-1 (85% TPH mass removal, previous SLR estimates), approx. 350 ft by 100 ft

Area, sq ft	depth, ft	Vol, cu ft	Vol, cy	Ton
35000	9	315000	11667	16333
Clean overburden				
35000	3	105000	3889	5444
Soil disposal needed			7778	10889

Remedy Components:

1 Construction contractor mobilization
2 Install Monitoring wells and Geoprobes
3 Demolish portions of the main manufacturing building for access to impacted soil for excavation
4 Install sheet-pile shoring to allow for soil excavation. Other temporary shoring may be explored at cheaper cost
5 Excavation of shallow soils to a depth of 9 feet below grade, hauling and off-site disposal
6 Excavation backfill, compaction, slab replacement,~~and building construction (removed section of building~~)
Not eligible for remedial action cost
7 Install Bioremediation system for deep on-property impacts and shallow and deep off-property impacts
6 Operate Bioremediation System for 5 years
7 Construction Management
8 Short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions

1 On-property soil excavation is estimated at 12,000 bcy [some area overlaps with excavation in woodlife area]
2 ACM in building is only in roofing
3 Excavation will require 3 month to complete followed by Bioremediation
4 3~~5~~ feet of clean overburden, 20% of impacted soil requires special disposal
1. There appears to be 3 ft clean overburden in this area. 2. There is no huge pool of NAPL; this could be typical of disposal of TPH contamianted soil and may not require special disposal.
5 175 cfm AI, 300 cfm SVE, 10,000 lb carbon consumed, 45 gpm NNS (described in Alternative 2)
6 Two injections of NNS at 125,000 lbs each
7 Groundwater sampling of 10 wells for 10 years (5 years semi-annually, 5 years annually)
8 Institutional controls restricting soil exposure and soil management plan (off-property)

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost	Comment
REMEDIAL ACTION						
Mobilization						
Mobilization	LS	1	$50,000	$50,000		This cost can be less/ shared with Wood life area soil removal
					$50,000	
Monitoring Well and Geoprobe installation						
Install monitoring wells	each	10	$4,000	$40,000		
Install Geoprobes	est	1	$40,000	$40,000		
Lab and Reporting	est	1	$20,000	$20,000		
					$100,000	
Site Controls / Institutional Controls (off-property)	est	1	$20,000	$20,000		
					$20,000	
Hotspot Soil Removal						
Demolish building	sq ft	25,000	$5	$125,000		
Building disposal	sq ft	25,000	$2.50	$62,500		
Well abandonment	ea	3	$2,000	$6,000		
Shoring installation	ln ft	900	$350	$315,000		$350 unit cost based on 15-20 feet sheet pile wall at custom plywood site
Dewatering system	est	1	$100,000	$100,000		This cost could actually be less based on less water involved
Excavation	bcy	11,667	$6	$70,002		
Disposal 5 to 15 feet regular waste	ton	8,711	$55	$479,125		Note this disposal cost was $23/ton in the 2016 draft RI/FS
Disposal 5 to 15 feet persistent waste	ton	2,178	$400	$871,136		Ecology believes it may not be necessary to separate the waste for $400/ton disposal. However, Ecology did not remove this cost for planning purpose.
Place and compact clean overburden	bcy	3,889	$5	$19,443		
Provide, place, and compact clean fill	bcy	7,778	$25	$194,450		
					$2,242,656	
Bio Pilot testing						
Install wells	each	4	$6,000	$24,000		
Install vertical recirculation well	each	1	$8,000	$8,000		
Testing Labor	month	6	$12,000	$72,000		
Equipment Rental and setup	month	6	$10,000	$60,000		
NNS chemicals	lbs	2,000	$33	$66,800		
Temporary power supply	LS	1	$10,000	$10,000		
Carbon vessels	each	2	$4,000	$8,000		
Install post test borings	LS	1	$10,000	$10,000		
Lab and Reporting	LS	1	$40,000	$40,000		
					$298,800	
Bioremediation System						
AI wells	each	24	$3,000	$72,000		Adjusted number of AI & NNS wells between Alternative 2 & 4 based on removal of contaminant from hotspot area
NNS wells	each	10	$4,000	$40,000		Adjusted number of AI & NNS wells between Alternative 2 & 4 based on removal of contaminant from hotspot area
Vertical mixing wells	each	5	$8,000	$40,000		Kept same as alternative 2 for deep contamiantion
Submersible pumps and headworks	each	10	$5,000	$50,000		Adjusted proportionately between Alternative 2 and 4
Trenching and Piping	feet	2,400	$110	$264,000		Adjusted proportionately between Alternative 2 and 4
Road Bore	LS	1	$40,000	$40,000		Kept same as alternative 2
Blowers and Enclosure	LS	1	$130,000	$130,000		Adjusted proportionately between Alternative 2 and 4
NNS addtion system	LS	1	$60,000	$60,000		Adjusted proportionately between Alternative 2 and 4
NNS chemicals	lbs	250,000	$3.40	$850,000		Adjusted proportionately between Alternative 2 and 4
NNS addition labor	LS	2	$35,000	$70,000		Adjusted proportionately between Alternative 2 and 4
Electrical Service	LS	1	$40,000	$40,000		Kept same as alternative 2 but could be less
					$1,656,000	
SSD						Not present in alternative 4 but added for the area not excavated
Pilot testing	est	1	$9,204	$9,204		
System construction and equipment installation	est	1	$35,000	$35,000		Adjusted for reduced area coverage
					$44,204	
Decommissioning						
Monitoring Well Decommissioning[1]	each	42	$2,000	$84,000		Adjusted for reduced area coverage
					(See NPV)	
Subtotal					$4,411,660	

Project Management	6%	$264,700
Design and permitting	10%	$441,166
Construction management	8%	$352,933
Taxes	10%	$441,166
Contingency	25%	$1,102,915

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost	Comment
Remedial Action Subtotal (Rounded to nearest $10,000)					**$7,010,000**	
Monitoring and Maintenance						
Semi-annual groundwater monitoring and sampling (yr 1-5)[1]	yr	5	$10,000	$50,000		
Groundwater monitoring and sampling - annual (yrs 6-10)[1]	yr	5	$5,000	$25,000		
Annual reporting (year 1-2)[1]	yr	2	$10,000	$20,000		
Annual reporting (yrs 3 - 10)[1]	yr	8	$4,000	$32,000		
Bio systems O&M, electrical, equipment repair	yr	5	$32,000	$160,000		
5 year review report (every 5 yrs)[1]	yr	2	$12,000	$24,000		
Subtotal NPV (see below)					$381,000	
Taxes 10%					$38,100	
Contingency 20%					$76,200	
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$500,000**	
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$7,500,000**	

[1] Year 1 value shown

Year	**Monitoring**	**O&M**	**Carbon**	**Decom**	**Reporting**	
SUM NPV:	$70,523	$153,168	$19,568	$74,476	$63,534	**$381,000**
1	$0	$0	$8,000	$0	$0	
2	$10,000	$32,000	$6,000	$0	$10,000	
3	$10,000	$32,000	$4,000	$0	$10,000	
4	$10,000	$32,000	$2,000	$0	$4,000	
5	$10,000	$32,000	$0	$0	$4,000	
6	$10,000	$32,000	$0	$0	$12,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$0	$4,000	
11	$5,000	$0	$0	$84,000	$12,000	

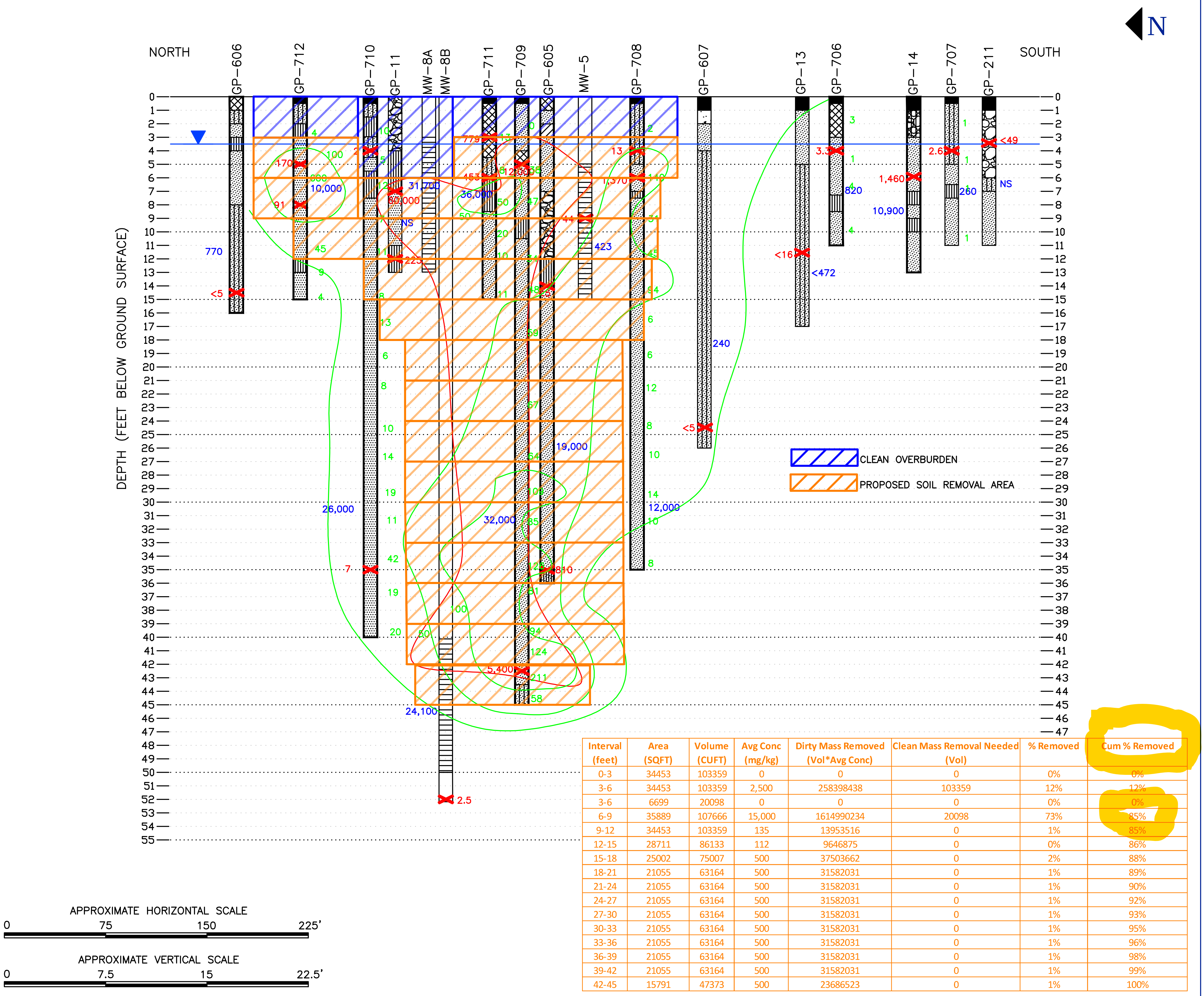
Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Last Saved: June 01, 2017 8:43:22 AM by ckramer Drawing path: N:\Portland\Projects\JELD-WEN\JELD-WEN NORD DOOR\2015 Assessment\FIGURES\X SECTION_090815.dwg



Interval (feet)	Area (SQFT)	Volume (CUFT)	Avg Conc (mg/kg)	Dirty Mass Removed (Vol*Avg Conc)	Clean Mass Removal Needed (Vol)	% Removed	Cum % Removed
0-3	34453	103359	0	0	0	0%	0%
3-6	34453	103359	2,500	258398438	103359	12%	12%
3-6	6699	20098	0	0	0	0%	0%
6-9	35889	107666	15,000	1614990234	20098	73%	85%
9-12	34453	103359	135	13953516	0	1%	85%
12-15	28711	86133	112	9646875	0	0%	86%
15-18	25002	75007	500	37503662	0	2%	88%
18-21	21055	63164	500	31582031	0	1%	89%
21-24	21055	63164	500	31582031	0	1%	90%
24-27	21055	63164	500	31582031	0	1%	92%
27-30	21055	63164	500	31582031	0	1%	93%
30-33	21055	63164	500	31582031	0	1%	95%
33-36	21055	63164	500	31582031	0	1%	96%
36-39	21055	63164	500	31582031	0	1%	98%
39-42	21055	63164	500	31582031	0	1%	99%
42-45	15791	47373	500	23686523	0	1%	100%

NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH-Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

▼		APPROXIMATE GROUNDWATER LEVEL
■	AS	ASPHALT
▨	CL	CLAY
☐		CONCRETE
▦	GM	GRAVEL WITH SILT
▦	GP	GRAVEL AND SAND
☐	PT	PEAT
▥	ML	SILT
▦	SM	SILTY SAND
☐	SP	SAND
☒		TOPSOIL
✕		SOIL SAMPLE LOCATION
200		SOIL ANALYTICAL RESULTS (TPH-Dx DIESEL RANGE IN MG/KG)
700		GROUNDWATER ANALYTICAL RESULTS (TPH-Dx DIESEL RANGE IN ug/L)
NS		NOT SAMPLED FOR SELECTED PARAMETER
25.2		PID READING IN PPM (700 SERIES GEOPROBE LOCATIONS ONLY)
—		PID CONTOURS IN PPM

FORMER E.A. NORD
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
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Drawing
CROSS-SECTION FOR ONSITE SAMPLE LOCATIONS
WITH TPH-DX ANALYTICAL RESULTS

Date June 1, 2017
Scale AS SHOWN
Fig. No.
File Name X SECTION_090815
Project No. 108.00228.00048

SLR

Table 10.2-1
Jeld-Wen Marine Disproportional Cost Analysis Matrix

					M-1	M-2	M-3	M-4a	M-4b	M-5	M-6	M-6.5
Criterion	**Weighting**	**Washington Administrative Code Language**	**Considerations for Site-Specific Evaluation**		**Source Control and Natural Recovery**	**Capping Focus: Armored Shoreline**	**Capping Focus: Soft Shoreline**	**Targeted Removal Focus: North Inlet Area (2-foot removal)**	**Targeted Removal Focus: North Inlet Area (4-foot removal)**	**Targeted Removal Focus: Southern Areas**	**Removal Focus**	**Removal Focus (SMA-3 and partial SMA-2 knoll)**
Protectiveness	30%	*Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.*	Protection of Human Health	Narrative	Does not achieve human health cleanup standards (cleanup levels not met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site in a reasonable timeframe. Does not meet MTCA minimum threshold requirements.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Scores lower than alternatives that include removal because of risks from contamination remaining on site above cleanup levels in SMA-1, SMA-2, and SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Scores lower than alternatives that include removal because of risks from contamination remaining on site above cleanup levels in SMA-1 and SMA-2, and SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Partial removal in inlet reduces risks compared to M-2 and M-3. Scores lower than M-4b through M-8 because greater amount of contamination remains on site above cleanup levels, particularly in SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Removal in inlet to 4 foot depth reduces risks compared to M-2, M-3, and M-4a. Scores lower than M-6, M-7 and M-8 because greater amount of contamination remains on site above cleanup levels, particularly in SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Scores lower than M-6, M-7 and M-8 because greater amount of contamination remains on site above cleanup levels, particularly in SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Removal of top 2-feet across SMA-3 reduces risks. Scores lower than M-7 and M-8 because contamination remains above cleanup levels in SMA-1, SMA-2, and below 2 feet in SMA-3.	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Contaminants fully removed from SMA-3 southern side results in substantial risk reduction. Scores higher than M-6 because of partial removal in SMA-2 knoll. Scores lower than M-8 becuase contaminants remain on site above cleanups levels in SMA-1 and SMA-2.
				Score	n/a	4.0	4.0	5.0	6.0	6.0	7.0	9.0
			Protection of the Environment	Narrative	Does not eliminate ecological risks associated with COPC releases to marine areas of the site in a reasonable timeframe. Unacceptable risks to benthic community remain. Does not meet MTCA minimum threshold requirements.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. However scores lower than M-4a through M-8 because sediment exceeding benthic criteria for PCBs remains on site in the knoll area; risks remain from contamination left in place above cleanup levels, particularly in SMA-3.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. However scores lower than M-4a through M-8 because sediment exceeding benthic criteria for PCBs remains on site in the knoll area; risks remain from contamination left in place above cleanup levels, particularly in SMA-3.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Partial removal in inlet reduces risk. However scores lower than M-4b through M-8 because sediment exceeding benthic criteria for PCBs remains on site in the knoll area; risks remain from contamination left in place above cleanup levels, particularly in SMA-3.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Partial removal in inlet reduces risk. However scores lower than M-5 through M-8 because sediment exceeding benthic criteria for PCBs remains on site in the knoll area; risks remain from contamination left in place above cleanup levels, particularly in SMA-3.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Sediment exceeding benthic criteria for PCBs removed from knoll area. Some risks remain from contamination left in place, particularly in SMA-3 inlet area and contamination deeper than 2 feet in the southern areas.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Removal of top 2-feet across SMA-3 reduces risks. Sediment exceeding benthic criteria for PCBs is removed from knoll area. Scores lower than M7 and M-8 because contamination remains above cleanup levels in SMA-1, SMA-2, and below 2 feet in SMA-3.	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Contaminants fully removed from SMA-3 southern side results in substantial risk reduction. Scores higher than M-6 because of partial removal in SMA-2 knoll. Scores lower than M-8 becuase contaminants remain on site above cleanups levels in SMA-1 and SMA-2.
				Score	n/a	4.0	4.0	5.0	6.0	7.0	7.0	9.0
			Total	**Score**	**n/a**	**4.0**	**4.0**	**5.0**	**6.0**	**6.5**	**7.0**	**9.0**
Permanence	20%	*The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.*	Certainty and Reliability	Narrative	Lowest certainty and reliability; MNR as the sole remedial action is uncertain and not reliable.	Greater comparative risk of remedy failure due to use of engineered cap-on-grade across all of SMA-3, and no removal of underlying contaminants exceeding cleanup levels. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Greater comparative risk of remedy failure due to use of engineered cap-on-grade across all of SMA-3, and no removal of underlying contaminants exceeding cleanup levels. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Partial removal in SMA-3 inlet increases certainty and reliability of capping technology. Some risk from cap failure, particularly on the southern side of the site where engineered cap-on-grade is used with no underlying contaminant removal. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Removal to 4-foot depth in SMA-3 inlet increases certainty and reliability of capping technology. Some potential risk from cap failure. MNR in SMA-1 and EMNR in SMA-2 have high certainty and reliability. Partial removal in SMA-3 (inlet) increases certainty and reliability. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Some potential risk from cap failure. MNR in SMA-1 and EMNR in SMA-2 have high certainty and reliability. Partial removal in SMA-3 (south shoreline) increases certainty and reliability. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Partial removal (top 2 feet) in SMA-3 increases certainty and reliability. Some potential risk from cap failure in SMA-3. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Full removal in SMA-3 southern areas increases certainty and reliability. Partial removal (top 2 feet) in SMA-3 inlet and portions of SMA-2 knoll increases certainty and reliability. Some potential risk from cap failure in SMA-3 inlet. MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.
				Score	n/a	4.0	4.0	5.0	6.0	7.0	8.0	9.0
			Residual Risks (Mass Removal)	Narrative	Cresote pilings would be removed; does not otherwise result in mass removal from any SMA. Unacceptable risks would remain because permanent remedial actions are not incorporated.	Capping on-grade in SMA-3 does not provide mass removal. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove contaminant mass from the Site.	Capping on-grade in SMA-3 does not provide mass removal. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove contaminant mass from the Site.	Partial removal in SMA-3 inlet provides targeted mass removal. Capping on-grade in SMA-3 southern side does not provide mass removal. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove greater contaminant mass from the Site.	Deeper partial removal in SMA-3 inlet provides targeted mass removal. Capping on-grade in SMA-3 southern side does not provide mass removal. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove greater contaminant mass from the Site.	Capping on-grade in SMA-3 inlet does not provide mass removal. Removal to 2-feet within SMA-3 southern side provides targeted mass removal of "hotspot" areas. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove greater contaminant mass from the Site.	Removal of top 2 feet of sediment within all of SMA-3 results in targeted mass removal of "hotspot" areas; contamination above cleanup levels remains at depth in some areas of SMA-3. EMNR in SMA-2 and MNR in SMA-1 do not provide mass removal. Risks are elevated compared to alternatives that remove greater contaminant mass from the Site.	Full removal in SMA-3 southern areas and portions of SMA-2 knoll results in additional targeted mass removal of "hotspot" areas. Contamination above cleanup levels remains at depth in some areas of SMA-3 inlet. Risks from contaminant concentrations following MNR in SMA-1 and EMNR in SMA-2 are not reduced by additional mass removal.
				Score	n/a	2.0	2.0	3.0	4.0	6.0	8.0	9.0
			Total	**Score**	**n/a**	**3.0**	**3.0**	**4.0**	**5.0**	**6.5**	**8.0**	**9.0**
Long-Term Effectiveness	20%	*Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances* ***are expected to remain on-site at concentrations that exceed cleanup levels,*** *the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.*	Climate Change Factors, including Erosion; Biological Processes; Seismic Events; Human Disturbance	Narrative	Greatest potential for future exposure or releases from climate change-related risks (sea level rise/increased storm intensities) in SMA-2 and SMA-3.	Potential for future exposure or releases from contaminant migration, climate-related risks and other disturbances, particularly for cap-on-grade areas (SMA-3). Climate change evaluations would be considered during design for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Potential for future exposure or releases from contaminant migration, climate-related risks and other disturbances, particularly for cap-on-grade areas (SMA-3). Climate change evaluations would be considered during design for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Partial removal in SMA-3 inlet reduces vulnerablity to climate change and other disturbances. Some potential for future exposure or releases from climate-related risks, particularly for capped areas in SMA-3. Climate change evaluations would be considered for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Partial removal to a 4-foot depth in SMA-3 inlet reduces vulnerablity to climate change and other disturbances. Some potential for future exposure or releases from climate-related risks, particularly for capped areas in SMA-3. Climate change evaluations would be considered for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Partial removal in the SMA-3 southern area reduces vulnerability to climate change and other disturbances. Some potential for future exposure or releases from climate-related risks, particularly for capped areas in SMA-3. Climate change evaluations would be considered for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Partial removal (top 2 feet) in SMA-3 reduces vulnerablity to climate change and other disturbances. Some potential for future exposure or releases from climate-related risks, particularly for capped areas in SMA-3. Climate change evaluations would be considered for engineered cap-on-grade design. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Full removal in SMA-3 southern areas and portions of SMA-2 knoll substantially decreases vulnerability to climate change and other disturbances. Some potential for future exposure or releases in SMA-3 inlet. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.
			Total	**Score**	**n/a**	**2.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**
Management of Short-Term Risk	10%	*The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.*	Risk to Human Health and Safety During Construction	Narrative	No active construction and no associated risk to human health and safety.	Includes risks from constructing thick caps in SMA-3 and applying a thin-layer cap in SMA-2. Risks are reduced compared to alternatives that incorporate sediment removal.	Includes risks from partial removal and engineered cap construction in SMA-3 and from construction of a thin-layer cap in SMA-2. Risks are reduced compared to alternatives with deeper removal depths and/or greater volumes of sediment removal.	Includes risks from partial removal and engineered cap construction in SMA-3 and from construction of a thin-layer cap in SMA-2. Risks are reduced compared to alternatives with deeper removal depths and/or greater volumes of sediment removal.	Includes risks from partial removal and engineered cap construction in SMA-3 and from construction of a thin-layer cap in SMA-2. Risks are reduced compared to alternatives with deeper removal depths and/or greater volumes of sediment removal.	Includes risks from partial removal and engineered cap construction in SMA-3 and from construction of a thin-layer cap in SMA-2. Risks are reduced compared to alternatives with deeper removal depths and/or greater volumes of sediment removal.	Includes risks from partial removal and capping in SMA-3 and from construction of a thin-layer cap in SMA-2.	Includes risks from full removal in SMA-3 southern side and partial SMA-2 knoll area and from construction of a thin-layer cap in SMA-2. Risks not as great as M-7 or M-8.
			Total	**Score**	**n/a**	**8.0**	**8.0**	**8.0**	**7.0**	**7.0**	**7.0**	**6.0**
Technical and Administrative Implementability	10%	*Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.*	Technical Feasibility	Narrative	Few technical challenges, however, does not meet minimum regulatory threshold requirements.	Engineered cap design must function in-perpetuity; may require extensive long-term monitoring and maintanence efforts, which could disprupt future site operations. Technology has been used at other sites in Puget Sound and experienced contractors and materials are locally available. Impacts to public may occur during construction; construction duration expected to be shorter than alternatives that include removal and cap/backfill.	Engineered cap design must function in-perpetuity; may require extensive long-term monitoring and maintanence efforts, which could disprupt future site operations. Technology has been used at other sites in Puget Sound and experienced contractors and materials are locally available. Impacts to public may occur during construction; construction duration expected to be shorter than alternatives that include removal and cap/backfill.	Some technical challenges associated with removal in the inlet; proven technology and locally available experienced contractors and materials. Engineered cap design must function in-perpetuity; may require extensive long-term monitoring and maintanence efforts, which could disprupt future site operations.	Some technical challenges associated with deeper removal in the inlet; proven technology and locally available experienced contractors and materials. Engineered cap design must function in-perpetuity; may require extensive long-term monitoring and maintanence efforts, which could disprupt future site operations.	Some technical challenges associated with removal on unstable intertidal subgrades; proven technology and locally available experienced contractors and materials. Engineered cap design must function in-perpetuity; may require extensive long-term monitoring and maintenance efforts, which could disprupt future site operations.	Some technical challenges associated with removal in the inlet; proven technology and locally available experienced contractors and materials. Fewer long-term monitoring and maintenance requirements expected than Alternatives M-2 through M-5.	Some technical challenges associated with removal in the inlet; proven technology and locally available experienced contractors and materials. Fewer long-term monitoring and maintenance requirements expected than Alternatives M-2 through M-6.
				Score	n/a	5.0	5.0	6.0	6.0	6.0	8.0	8.0
			Administrative Feasibility	Narrative	No difficult permit requirements, however, does not meet minimum regulatory threshold requirements.	Cap-on-grade may be more difficult to permit; long-term monitoring and maintanence greater with caps, particularly cap-on-grade areas. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Cap-on-grade may be more difficult to permit; long-term monitoring and maintanence greater with caps, particularly cap-on-grade areas. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Cap-on-grade may be more difficult to permit; long-term monitoring and maintanence greater with caps, particularly cap-on-grade areas. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Cap-on-grade may be more difficult to permit; long-term monitoring and maintanence greater with caps, particularly cap-on-grade areas. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Cap-on-grade may be more difficult to permit; long-term monitoring and maintanence greater with caps, particularly cap-on-grade areas. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Difficult permit requirements not anticipated. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.	Difficult permit requirements not anticipated. Caps may require institutional controls (restrictive covenants). Mitigation may be required for impacts to natural resources during construction.
				Score	n/a	3.0	3.0	5.0	5.0	6.0	8.0	8.0
			Total	**Score**	**n/a**	**4.0**	**4.0**	**5.5**	**5.5**	**6.0**	**8.0**	**8.0**
Consideration of Public Concerns	10%	*Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.*	Balance the Public Desire for Environmental Cleanup and Sustainable Local Economic Conditions	Narrative	Unlikely to satisfy public desire for active cleanup of the Site.	Leaving contamination in place (no removal) likely to be a concern to the public. Some impacts to public may occur during construction (e.g. traffic restrictions on West Marine View Dr.). Construction duration expected to be shorter than removal and cap alternatives.	Leaving contamination in place (no removal) likely to be a concern to the public. Some impacts to public may occur during construction (e.g. traffic restrictions on West Marine View Dr.). Construction duration expected to be shorter than removal and cap alternatives.	Greater balance than M-2 and M-3 between public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic). Public may be concerned about risks from contamination left in place.	Greater balance than M-2 and M-3 between public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic). Public may be concerned about risks from contamination left in place.	Greater balance than M-2 and M-3 between public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic). Public may be concerned about risks from contamination left in place.	Greater balance between public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic).	Greater balance between public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic).
			Total	**Score**	**n/a**	**3.0**	**3.0**	**5.0**	**5.0**	**5.0**	**8.0**	**9.0**
				Total Weighted Benefits	**n/a**	**3.7**	**3.7**	**4.8**	**5.4**	**6.1**	**7.2**	**8.4**

Table 10.2-1
Jeld-Wen Marine Disproportional Cost Analysis Matrix

				M-1	M-2	M-3	M-4a	M-4b	M-5	M-6	M-6.5
Criterion	Weighting	Washington Administrative Code Language	Considerations for Site-Specific Evaluation	Source Control and Natural Recovery	Capping Focus: Armored Shoreline	Capping Focus: Soft Shoreline	Targeted Removal Focus: North Inlet Area (2-foot removal)	Targeted Removal Focus: North Inlet Area (4-foot removal)	Targeted Removal Focus: Southern Areas	Removal Focus	Removal Focus (SMA-3 and partial SMA-2 knoll)
			Cost	$2,773,000	$5,858,000	$7,028,000	$7,282,000	$7,839,000	$8,988,000	$10,370,000	$12,679,709

Table 10.2-1
Jeld-Wen Marine Disproportional Cost Analysis Matrix

Criterion	Weighting	Washington Administrative Code Language	Considerations for Site-Specific Evaluation		M-7	M-8
					Full Removal Focus	**Full Removal**
Protectiveness	30%	*Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.*	Protection of Human Health	Narrative	Achieves human health cleanup standards (cleanup levels met within top 1 foot of sediment on a SWAC basis) throughout the marine areas of the site immediately following construction. Contaminants fully removed from SMA-3 results in substantial risk reduction. Scores lower than M-8 because contamination remains on site above cleanup levels in SMA-1 and SMA-2.	Achieves human health cleanup standards throughout the marine areas of the site immediately following construction.
				Score	9.0	10.0
			Protection of the Environment	Narrative	Achieves cleanup standards protective of ecological receptors for COPC throughout the marine areas of the site immediately following construction. Contaminants fully removed from SMA-3 results in substantial risk reduction. Scores lower than M-8 because contamination remains on Site above cleanup levels in SMA-1 and SMA-2.	Eliminates ecological risks associated COPC throughout the marine areas of the site immediately following construction.
				Score	9.0	10.0
			Total	**Score**	**9.0**	**10.0**
Permanence	20%	*The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.*	Certainty and Reliability	Narrative	Full removal in SMA-3 increases certainty and reliability; no potential risk from cap failure. MNR in SMA-1 and EMNR in SMA-2 have high certainty and reliability. Scores lower than M-8 becuase MNR in SMA-1 and EMNR in SMA-2 rely on an extended timeframe to achieve a permanent reduction in toxicity or volume of hazardous substances.	Complete removal provides lowest potential for future exposure or releases.
				Score	9.0	10.0
			Residual Risks (Mass Removal)	Narrative	Full removal in SMA-3 results in substantial mass removal. Risks from contaminant concentrations following MNR in SMA-1 and EMNR in SMA-2 are not reduced by additional mass removal.	Complete removal provides the highest COPC mass reduction in SMA-1, SMA-2 and SMA-3; however, dredging residuals from removal in all three SMAs result in higher overall residual contamination.
				Score	9.0	9.5
			Total	**Score**	**9.0**	**9.8**
Long-Term Effectiveness	20%	*Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances* ***are expected to remain on-site at concentrations that exceed cleanup levels,*** *the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.*	Climate Change Factors, including Erosion; Biological Processes; Seismic Events; Human Disturbance	Narrative	Complete removal in SMA-3 substantially descreases potential for future exposure or releases. Some uncertainty exists regarding the long-term performance of MNR in SMA-1 and EMNR in SMA-2.	Complete removal provides lowest potential for future exposure or releases; climate change does not increase risk of future exposure or releases.
			Total	**Score**	**8.0**	**10.0**
Management of Short-Term Risk	10%	*The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.*	Risk to Human Health and Safety During Construction	Narrative	Includes risks from full removal in SMA-3 and from construction of a thin-layer cap in SMA-2. Risks not as great as M-8.	Alternative with the most active and intensive construction and highest associated risk.
			Total	**Score**	**5.0**	**3.0**
Technical and Administrative Implementability	10%	*Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.*	Technical Feasibility	Narrative	Technical challenges associated with deepest removal in the inlet; however, uses proven technology and locally experienced contractors and materials are available. Fewer long-term monitoring and maintanence requirements expected than Alternatives M-2 through M-6.	Technical challenges include large excavation footprints on tidally influenced mudflat, deepest cuts, slope stability shoring requirements. No institutional control or long-term maintanence and monitoring requirements.
				Score	7.0	3.0
			Administrative Feasibility	Narrative	No difficult institutional controls or long-term maintanance and monitoring requirements. Difficult permit requirements not anticipated. Mitigation may be required for impacts to natural resources during construction.	No institutional controls or long-term maintanance and monitoring requirements. May pose some permitting challenges due to large disturbance area. Mitigation may be required for impacts to natural resources during construction.
				Score	9.0	8.0
			Total	**Score**	**8.0**	**5.5**
Consideration of Public Concerns	10%	*Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.*	Balance the Public Desire for Environmental Cleanup and Sustainable Local Economic Conditions	Narrative	Balances public desire for active cleanup with concerns over economic impacts and disruption to the local community (e.g. noise, traffic).	Would satisfy public desire for complete removal, but high cost, economic impacts, and disruption to the community from construction may be more of a concern for the public.
			Total	**Score**	**8.0**	**3.0**
				Total Weighted Benefits	**8.2**	**8.1**

Table 10.2-1
Jeld-Wen Marine Disproportional Cost Analysis Matrix

Criterion	Weighting	Washington Administrative Code Language	Considerations for Site-Specific Evaluation	M-7 Full Removal Focus	M-8 Full Removal
			Cost	$13,633,000	$38,832,000

Table N-3
Summary of Alternative Costs

Task	Alternative 1	Alternative 2	Alternative 3	Alternative 4a	Alternative 4b	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Mobilization and Demobilization	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 500,000	$ 500,000	$ 900,000
Site Preparation	$ 1,040,000	$ 1,040,000	$ 1,776,000	$ 1,110,000	$ 1,110,000	$ 1,110,000	$ 1,110,000	$ 1,110,000	$ 1,110,000
Enhanced Natural Recovery	$ -	$ 599,638	$ 599,638	$ 599,638	$ 599,638	$ 599,638	$ 599,638	$ 599,638	$ -
Dredging and Disposal	$ -	$ -	$ -	$ 706,577	$ 1,008,904	$ 1,828,438	$ 2,476,164	$ 4,485,198	$ 17,776,576
Engineered Cap/Backfill	$ -	$ 795,582	$ 795,582	$ 795,582	$ 853,577	$ 795,582	$ 795,582	$ 1,096,686	$ 4,653,374
Environmental Controls	$ -	$ 100,000	$ 100,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 100,000
Bathymetric Surveys	$ 20,000	$ 140,000	$ 150,000	$ 160,000	$ 160,000	$ 180,000	$ 200,000	$ 200,000	$ 90,000
Subtotal Construction Costs	**$ 1,360,000**	**$ 2,975,220**	**$ 3,721,220**	**$ 3,871,797**	**$ 4,232,119**	**$ 5,013,659**	**$ 5,881,385**	**$ 8,191,523**	**$ 24,629,950**
Construction Contingency & WSST	**$ 537,200**	**$ 1,175,212**	**$ 1,469,882**	**$ 1,529,360**	**$ 1,671,687**	**$ 1,980,395**	**$ 2,323,147**	**$ 3,235,652**	**$ 9,728,830**
Total Construction Cost	$ 1,897,200	$ 4,150,433	$ 5,191,103	$ 5,401,157	$ 5,903,806	$ 6,994,054	$ 8,204,532	$ 11,427,175	$ 34,358,780
Pre-Design Sampling	$ -	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000
Project Management	$ 97,802	$ 198,210	$ 225,089	$ 235,310	$ 245,511	$ 239,723	$ 276,824	$ 324,003	$ 794,544
Engineering and Design	$ 94,860	$ 207,522	$ 259,555	$ 270,058	$ 295,190	$ 349,703	$ 410,227	$ 571,359	$ 1,717,939
Permitting	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Construction Management Support	$ 104,074	$ 210,921	$ 239,525	$ 250,401	$ 261,257	$ 255,098	$ 294,577	$ 344,782	$ 845,501
Environmental Monitoring During Construction	$ 79,914	$ 161,958	$ 183,921	$ 192,273	$ 200,608	$ 195,878	$ 226,193	$ 264,743	$ 649,224
Verification Sampling	$ -	$ -	$ -	$ 4,000	$ 4,000	$ 25,000	$ 29,000	$ 29,000	$ 166,000
Institutional Controls	$ -	$ 47,850	$ 47,850	$ 47,850	$ 47,850	$ 47,850	$ 47,850	$ -	$ -
Long-Term Monitoring	$ 399,360	$ 581,160	$ 581,160	$ 581,160	$ 581,160	$ 581,160	$ 581,160	$ 371,520	$ -
Habitat Mitigation Costs									
Total Non-Construction Cost	**$ 876,009**	**$ 1,707,620**	**$ 1,837,099**	**$ 1,881,052**	**$ 1,935,576**	**$ 1,994,412**	**$ 2,165,831**	**$ 2,205,407**	**$ 4,473,208**
Total Cost	**$ 2,773,209**	**$ 5,858,053**	**$ 7,028,202**	**$ 7,282,210**	**$ 7,839,382**	**$ 8,988,466**	**$ 10,370,363**	**$ 13,632,582**	**$ 38,831,988**

Table N-4

Alternative M1 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	0	$ -
Prepare upland staging (no dredging)	$ 80,000	LS	1	$ 80,000
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	0	$ -
Place 12-inch thick Silty Sand Material	$ 30	TON	0	$ -
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	0	$ -
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	0	$ -
Dredge material dewatering and treatment	$ 12,500	Monthly	0	$ -
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	0	$ -
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	0	$ -
Bathymetric/Topographic Surveys	$ 10,000	LS	2	$ 20,000
Subtotal Direct Construction Costs				$ 1,360,000
Contingency	30%	Percent		$ 408,000
WSST	9.5%	Percent		$ 129,200
Total Direct Construction Cost				$ 1,897,200
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	0	$ -
Project Management	$ 42,100	Monthly	2.3	$ 97,802
Engineering and Design	$ 94,860	LS	1	$ 94,860
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	2.3	$ 104,074
Environmental Monitoring During Construction	$ 34,400	Monthly	2.3	$ 79,914
Verification Sampling	$ 10,000	LS	0	$ -
Institutional Controls	$ 16,500	Acre	0	$ -
Long Term Monitoring	$ 399,360	LS	1	$ 399,360
Total Indirect Construction Costs				$ 876,009
Grand Total Cost (Total Direct + Total Indirect)				**$ 2,773,209**

Construction Duration	Daily Rate	Quantity	Unit	Months
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	0	TONS	0
Temporary Shoring	40	0	LF	0
Dredging - Land Based Equipment	500	0	CY	0
Place Backfill Material	1200	0	TONS	0
Place Engineered Cap Material	600	0	Tons	0
Total Duration				2.3

Table N-4
Alternative M1 Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-5

Alternative M2 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Year	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	0	$ -
Prepare upland staging creosote debris processing	$ 80,000	LS	1	$ 80,000
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	0	$ -
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	0	$ -
Dredge material dewatering and treatment	$ 12,500	Monthly	0	$ -
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	0	$ -
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	1	$ 100,000
Bathymetric/Topographic Surveys	$ 10,000	LS	14	$ 140,000
Subtotal Direct Construction Costs				$ 2,975,220
Contingency	30%	Percent		$ 892,566
WSST	9.5%	Percent		$ 282,646
Total Direct Construction Cost				$ 4,150,433
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	4.7	$ 198,210
Engineering and Design	$ 207,522	LS	1	$ 207,522
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	4.7	$ 210,921
Environmental Monitoring During Construction	$ 34,400	Monthly	4.7	$ 161,958
Verification Sampling	$ 10,000	LS	0	$ -
Institutional Controls	$ 16,500	Acre	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,707,620
Grand Total Cost (Total Direct + Total Indirect)				**$ 5,858,053**

Table N-5
Alternative M2 Cost Estimate

Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13325	TONS	1.0
Temporary Shoring	40	0	LF	0.0
Dredging - Land Based Equipment	500	0	CY	0
Place Backfill Material	1200	0	Tons	0
Place Engineered Cap Material	600	17680	CY	1.4
Total Duration				4.7

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-6
Alternative M3 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Year	1	$ 200,000
Demobilization	$ 100,000	Year	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	0	$ -
Prepare upland staging creosote debris processing	$ 80,000	LS	1	$ 80,000
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 420	LF	2300	$ 966,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	0	$ -
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	0	$ -
Dredge material dewatering and treatment	$ 12,500	Monthly	0.0	$ -
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	0	$ -
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	1	$ 100,000
Bathymetric/Topographic Surveys	$ 10,000	LS	15	$ 150,000
Subtotal Direct Construction Costs				$ 3,721,220
Contingency	30%	Percent		$ 1,116,366
WSST	9.5%	Percent		$ 353,516
Total Direct Construction Cost				$ 5,191,103
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	5.3	$ 225,089
Engineering and Design	$ 259,555	LS	1	$ 259,555
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	5.3	$ 239,525
Environmental Monitoring During Construction	$ 34,400	Monthly	5.3	$ 183,921
Verification Sampling	$ 10,000	LS	0	$ -
Institutional Controls	$ 16,500	Acres	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,837,099
Grand Total Cost (Total Direct + Total Indirect)				**$ 7,028,202**

Table N-6

Alternative M3 Cost Estimate

Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	0	LF	0.0
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	0	LF	0.0
Dredging - Land Based Equipment	500	0	CY	0.0
Place Backfill Material	1200	35000	Tons	1.3
Place Engineered Cap Material	600	17,680	CY	1.4
Total Duration				5.3

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-7

Alternative M4a Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Year	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	2,047	$ 71,641
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	2,047	$ 10,234
Dredge material dewatering and treatment	$ 12,500	Monthly	6	$ 69,866
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	3,070	$ 254,836
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	16	$ 160,000
Subtotal Direct Construction Costs				$ 3,871,797
Contingency	30%	Percent		$ 1,161,539
WSST	9.5%	Percent		$ 367,821
Total Direct Construction Cost				$ 5,401,157
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	5.6	$ 235,310
Engineering and Design	$ 270,058	LS	1	$ 270,058
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	5.6	$ 250,401
Environmental Monitoring During Construction	$ 34,400	Monthly	5.6	$ 192,273
Verification Sampling	$ 10,000	Acre	0.4	$ 4,000
Institutional Controls	$ 16,500	LS	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,881,052
Grand Total Cost (Total Direct + Total Indirect)				**$ 7,282,210**

Table N-7

Alternative M4a Cost Estimate

Construction Duration	Daily Rate	Quantity	Unit	Months
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	2,047	CY	0.2
Place Backfill Material	1200	0	Tons	0.00
Place Engineered Cap Material	600	17,680	Tons	1.4
Total Duration				5.6

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-8

Alternative M4b Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Year	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	CY	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	3,866	$ 135,321
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	3,866	$ 19,332
Dredge material dewatering and treatment	$ 12,500	Monthly	6	$ 72,895
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	5,799	$ 481,356
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	1,933	$ 28,997
Place Backfill Material	$ 15	TON	1,933	$ 28,997
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	16	$ 160,000
Subtotal Direct Construction Costs				$ 4,232,119
Contingency	30%	Percent		$ 1,269,636
WSST	9.5%	Percent		$ 402,051
Total Direct Construction Cost				$ 5,903,806
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	5.8	$ 245,511
Engineering and Design	$ 295,190	LS	1	$ 295,190
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	5.8	$ 261,257
Environmental Monitoring During Construction	$ 34,400	Monthly	5.8	$ 200,608
Verification Sampling	$ 10,000	Acre	0.4	$ 4,000
Institutional Controls	$ 16,500	LS	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,935,576
Grand Total Cost (Total Direct + Total Indirect)				**$ 7,839,382**

Construction Duration	Daily Rate	Quantity	Unit	Months
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	3,866	CY	0.4
Place Backfill Material	1200	1933.157	Tons	0.07
Place Engineered Cap Material	600	17,680	Tons	1.4
Total Duration				5.8

Table N-8
Alternative M4b Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-9

Alternative M5 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	1	$ 200,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	10,682	$ 373,885
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	0	$ -
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	10,682	$ 53,412
Dredge material dewatering and treatment	$ 12,500	Monthly	6	$ 71,177
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	16,024	$ 1,329,964
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	18	$ 180,000
Subtotal Direct Construction Costs				$ 5,013,659
Contingency	30%	Percent		$ 1,504,098
WSST	9.5%	Percent		$ 476,298
Total Direct Construction Cost				$ 6,994,054
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	5.7	$ 239,723
Engineering and Design	$ 349,703	LS	1	$ 349,703
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	5.7	$ 255,098
Environmental Monitoring During Construction	$ 34,400	Monthly	5.7	$ 195,878
Verification Sampling	$ 10,000	LS	2.5	$ 25,000
Institutional Controls	$ 16,500	LS	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 1,994,412
Grand Total Cost (Total Direct + Total Indirect)				**$ 8,988,466**

Table N-9
Alternative M5 Cost Estimate

Construction Duration	Daily Rate	Quantity	Unit	Months
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	0	LF	0.0
Dredging - Land Based Equipment	500	10,682	CY	1.0
Place Backfill Material	1200	0	Tons	0.00
Place Engineered Cap Material	600	17,680	Tons	1.4
Total Duration				5.7

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-10

Alternative M6 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	12,729	$ 445,526
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	12,729	$ 63,647
Dredge material dewatering and treatment	$ 12,500	Monthly	6.6	$ 82,192
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	19,094	$ 1,584,799
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	0	$ -
Place Backfill Material	$ 15	TON	0	$ -
Purchase & Transport Engineered Cap Material	$ 15	TON	17,680	$ 265,194
Place Engineered Cap Material	$ 30	TON	17,680	$ 530,388
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 5,881,385
Contingency	30%	Percent		$ 1,764,415
WSST	9.5%	Percent		$ 558,732
Total Direct Construction Cost				$ 8,204,532
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	6.6	$ 276,824
Engineering and Design	$ 410,227	LS	1	$ 410,227
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	6.6	$ 294,577
Environmental Monitoring During Construction	$ 34,400	Monthly	6.6	$ 226,193
Verification Sampling	$ 10,000	Acre	2.9	$ 29,000
Institutional Controls	$ 16,500	LS	2.9	$ 47,850
Long Term Monitoring	$ 581,160	LS	1	$ 581,160
Total Indirect Construction Costs				$ 2,165,831
Grand Total Cost (Total Direct + Total Indirect)				**$ 10,370,363**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	12,729	CY	1.2
Place Backfill Material	1200	0	Tons	0.00
Place Engineered Cap Material	600	17,680	Tons	1.4
Total Duration				6.6

Table N-10
Alternative M6 Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-11
Alternative M7 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	13,325	$ 199,879
Place 12-inch thick Silty Sand Material	$ 30	TON	13,325	$ 399,759
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	24,371	$ 852,978
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	1	$ 80,000
Sediment stockpiling	$ 5	CY	24,371	$ 121,854
Dredge material dewatering and treatment	$ 12,500	Monthly	8	$ 96,200
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	36,556	$ 3,034,166
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	36,556	$ 548,343
Place Backfill Material	$ 15	TON	36,556	$ 548,343
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 8,191,523
Contingency	30%	Percent		$ 2,457,457
WSST	9.5%	Percent		$ 778,195
Total Direct Construction Cost				$ 11,427,175
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	7.70	$ 324,003
Engineering and Design	$ 571,359	LS	1	$ 571,359
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	7.70	$ 344,782
Environmental Monitoring During Construction	$ 34,400	Monthly	7.70	$ 264,743
Verification Sampling	$ 10,000	Acre	2.9	$ 29,000
Institutional Controls	$ 16,500	LS	0	$ -
Long Term Monitoring	$ 371,520	LS	1	$ 371,520
Total Indirect Construction Costs				$ 2,205,407
Grand Total Cost (Total Direct + Total Indirect)				**$ 13,632,582**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	13,325	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	24,371	CY	2.2
Place Backfill Material	1200	36556.213	Tons	1.41
Place Engineered Cap Material	600	0	Tons	0.0
Total Duration				7.7

Table N-11
Alternative M7 Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-12

Alternative M-8 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	4	$ 800,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	0	$ -
Place 12-inch thick Silty Sand Material	$ 30	TON	0	$ -
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	103,408	$ 3,619,291
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	900	$ 450,000
Dredging - Excavation Dewatering	$ 80,000	LS	1	$ 80,000
Sediment stockpiling	$ 5	CY	103,408	$ 517,042
Dredge material dewatering and treatment	$ 12,500	Monthly	19	$ 235,910
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	155,112	$ 12,874,334
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	155,112	$ 2,326,687
Place Backfill Material	$ 15	TON	155,112	$ 2,326,687
Purchase & Transport Engineered Cap Material	$ 15	TON	0	$ -
Place Engineered Cap Material	$ 30	TON	0	$ -
Environmental Controls	$ 100,000	LS	1	$ 100,000
Bathymetric/Topographic Surveys	$ 10,000	LS	9	$ 90,000
Subtotal Direct Construction Costs				$ 24,629,950
Contingency	30%	Percent		$ 7,388,985
WSST	9.5%	Percent		$ 2,339,845
Total Direct Construction Cost				$ 34,358,780
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	18.9	$ 794,544
Engineering and Design	$ 1,717,939	LS	1	$ 1,717,939
Permitting	$ 100,000	Acre	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	18.9	$ 845,501
Environmental Monitoring During Construction	$ 34,400	Monthly	18.9	$ 649,224
Verification Sampling	$ 10,000	Acre	16.6	$ 166,000
Institutional Controls	$ 16,500	LS	0	$ -
Long Term Monitoring	$ -	LS	1	$ -
Total Indirect Construction Costs				$ 4,473,208
Grand Total Cost (Total Direct + Total Indirect)				**$ 38,831,988**
Construction Duration	**Daily Rate**	**Quantity**	**Unit**	**Months**
Removal of Piling and Large Woody Debris	10	100	Ea	$ 0.5
Demolition	1	22	Ea	$ 1
Prepare upland staging for dredged sediments	1	3	Ea	$ 0.1
Rip rap armored shoreline	150	2300	LF	$ 1
Place 12-inch thick Silty Sand Material	600	0	TONS	$ -
Temporary Shoring	40	900	LF	$ 1
Dredging - Land Based Equipment	500	103,408	CY	$ 10
Place Backfill Material	1200	155112	Tons	$ 6
Place Engineered Cap Material	600	0	CY	$ -
Total Duration				$ 18.9

Table N-12
Alternative M-8 Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

These estimates are developed using current and generally accepted engineering cost estimation methods. Note that these estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to Anchor QEA, LLC at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. Anchor QEA, LLC is not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table N-10

Ecology Alternative 6.5 Cost Estimate

Technology/Construction Task Element	Unit Price	Unit	Quantity	Total Cost
Direct Construction Costs				
Mobilization and Demobilization				
Mobilization	$ 200,000	Season	2	$ 400,000
Demobilization	$ 100,000	LS	1	$ 100,000
Site Preparation				
Removal of Piling and Large Woody Debris	$ 250	EA	200	$ 50,000
Processing, Transportation and Disposal of Woody Debris	$ 225	TON	2000	$ 450,000
Prepare upland staging for dredged sediments	$ 150,000	LS	1	$ 150,000
Prepare upland staging creosote debris processing	$ 80,000	LS	0	$ -
Demolition of Remnant Barge Structure	$ 30,000	LS	1	$ 30,000
Demolition of Bulkhead Structure	$ 200,000	LS	1	$ 200,000
Shoreline protection at top of bank	$ 100	LF	2300	$ 230,000
Enhanced Monitored Natural Recovery				
Procure and Transport Beneficial Reuse Silty Sand Material	$ 15	TON	12,598	$ 188,970
Place 12-inch thick Silty Sand Material	$ 30	TON	12,598	$ 377,940
Dredge and Disposal				
Dredging - Land Based Equipment	$ 35	CY	21,601	$ 756,035
Dredging - Slope shoring and protection of utilities/road	$ 500	LF	600	$ 300,000
Dredging - Excavation Dewatering	$ 80,000	LS	0	$ -
Sediment stockpiling	$ 5	CY	21,601	$ 108,005
Dredge material dewatering and treatment	$ 12,500	Monthly	7.4	$ 92,500
Placing Upland Beneficial Reuse Material	$ 10	CY	0	$ -
Dredged Material Transport and Disposal - Subtitle D	$ 83	TON	32,401	$ 2,689,283
Backfill and Engineered Cap				
Purchase and Transport Backfill Material	$ 15	TON	32,401	$ 486,015
Place Backfill Material	$ 15	TON	32,401	$ 486,015
Purchase & Transport Engineered Cap Material	$ 15	TON	2,866	$ 42,990
Place Engineered Cap Material	$ 30	TON	2,866	$ 85,980
Environmental Controls	$ 100,000	LS	2	$ 200,000
Bathymetric/Topographic Surveys	$ 10,000	LS	20	$ 200,000
Subtotal Direct Construction Costs				$ 7,623,733
Contingency	30%	Percent		$ 2,287,120
WSST	9.5%	Percent		$ 724,255
Total Direct Construction Cost				$ 10,635,108
Indirect Construction Costs				
Pre-design sampling	$ 200,000	LS	1	$ 200,000
Project Management	$ 42,100	Monthly	7.4	$ 311,540
Engineering and Design	$ 410,227	LS	1	$ 410,227
Permitting	$ 100,000	LS	1	$ 100,000
Construction Management Support	$ 44,800	Monthly	7.4	$ 331,520
Environmental Monitoring During Construction	$ 34,400	Monthly	7.4	$ 254,560
Verification Sampling	$ 10,000	Acre	2.9	$ 29,000
Institutional Controls	$ 16,500	LS	0.47	$ 7,755
Long Term Monitoring	$ 400,000	LS	1	$ 400,000
Total Indirect Construction Costs				$ 2,044,602
Grand Total Cost (Total Direct + Total Indirect)				**$ 12,679,709**

Construction Duration	Daily Rate	Quantity	Unit	Months
Removal of Piling and Large Woody Debris	10	100	Ea	0.5
Demolition	1	22	Ea	1.0
Prepare upland staging for dredged sediments	1	3	Ea	0.1
Rip rap armored shoreline	150	2300	LF	0.7
Place 12-inch thick Silty Sand Material	600	12,598	TONS	1.0
Temporary Shoring	40	600	LF	0.7
Dredging - Land Based Equipment	500	21,601	CY	2.0
Place Backfill Material	1200	32401	Tons	1.25
Place Engineered Cap Material	600	2,866	Tons	0.2
Total Duration				7.4

Table N-10
Ecology Alternative 6.5 Cost Estimate

Notes:
LF: Linear Foot
CY: Cubic yard
Ea: Each
LS: Lump sum

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2020 Revised Draft

Remedial Investigation/Feasibility Study

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April 2020

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APPENDICES

ACRONYMS

2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
ARARs	applicable or relevant and appropriate requirements
ARI	Analytical Resources Inc.
AS	Air sparging
AST	above ground storage tank
bgs	below ground surface
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe
BSAF	biota/sediment accumulation factor
BTEX	benzene, toluene, ethylbenzene, total xylenes
CAP	Cleanup Action Plan
CFR	Code of Federal Regulations
CHP	catalyzed hydrogen peroxide
cm	centimeters
COPC	contaminants of potential concern
Corps	U.S. Army Corps of Engineers
cPAH	carcinogenic polycyclic aromatic hydrocarbons
CSL	cleanup screening level
CSM	conceptual site model
CWA	Clean Water Act
DCA	Disproportionate Cost Analysis
DMMP	Dredged Material Management Program
DNS	determination of non-significance
dw	dry weight
EA	exposure area
Ecology	Washington State Department of Ecology
EIM	environmental information management
EIS	environmental impact statement
EMC	Everett Municipal Code
EMNR	enhanced monitored natural recovery
EPA	Environmental Protection Agency
FS	feasibility study
HCID	hydrocarbon identification
HDPE	High-density polyethylene
HPA	hydraulic project approval
IDW	inverse distance weighting
IHS	Indicator Hazardous Substances
ISCO	In-Situ Chemical Oxidation
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MDL	method detection limit
MNA	monitored natural attenuation

ACRONYMS (CONTINUED)

MNR	monitored natural recovery
MTCA	Model Toxics Control Act
MW	monitoring well
NRCS	National Resource Conservation Service
NWP	Nationwide Permit
OC	organic carbon
OMM	operations, monitoring and maintenance
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PCL	preliminary cleanup level
PCP	pentachlorophenol
PHS	priority habitat species
POTW	publicly-owned treatment works
PQL	practical quantitation limit
PSCAA	Puget Sound Clean Air Agency
QAPP	quality assurance project plan
RCW	Revised Code of Washington
RAL	Remedial action levels
RI	remedial investigation
SAP	sampling and analysis plan
SCO	sediment cleanup objective
SCUM II	Sediment Cleanup User's Manual II
SEPA	State Environmental Policy Act
SLV	screening level values
SMA	sediment management area
SMS	Sediment Management Standards
SMP	Shoreline Master Program
SVE	soil vapor extraction
SVOC	semi-volatile organic compounds
SWAC	surface weighted average concentration
TEE	Terrestrial Ecological Evaluation
TEF	toxic equivalency factor
TEQ	toxic equivalency quotient
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TPH-Gx	total petroleum hydrocarbons as gasoline
TPH-Dx	total petroleum hydrocarbons as diesel
TVS	total volatile solids
USC	United States Code
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

ACRONYMS (CONTINUED)

WDNR	Washington Department of Natural Resources

EXECUTIVE SUMMARY

This report presents this 2020 Revised Draft Remedial Investigation (RI) and Feasibility Study (FS) of the former E.A. Nord, Inc, door facility (through its successor, JELD-WEN, Inc. [JELD-WEN]) located at 300 West Marine View Drive, Everett, Washington, 98201 (Site). In accordance with the requirements of the 2008 Agreed Order Number DE 5095 between JELD-WEN and the Washington State Department of Ecology (Ecology), this RI/FS report summarizes the findings of soil, groundwater, seep water, soil vapor, sediment porewater, and bulk sediment investigations performed at the Site. The objective of the RI was to collect the data necessary to adequately characterize the Site for the purpose of developing and evaluating cleanup action alternatives. The purpose of the FS was to develop and evaluate cleanup action alternatives to enable a cleanup action to be selected for the Site.

JELD-WEN no longer owns the Site property. Historically, JELD-WEN owned five adjoining parcels with a combined upland area of approximately 36 acres, as well as adjacent tidal mudflats which were sold to W&W Everett Investments LLC in December 2013. Properties surrounding the W&W Everett Investments LLC-owned property include parcels owned by the Port of Everett, the City of Everett, the Burlington Northern Santa Fe (BNSF) railroad, and Wick Family Properties LLC.

Historical activities at the Site have included casket manufacturing, pole treating, fish net storage, and wood door and sash manufacturing. JELD-WEN acquired certain assets, including the real property of the E.A. Nord, Inc, door plant, in May 1986 through the bankruptcy court. JELD-WEN operations included the purchase of rough green wood; drying, planing and cutting the lumber; and assembly of finished wooden doors, rails, posts, columns, and spindles. Operations at Nord Door ceased in 2005. Several asphalt operations (currently Cadman, formerly CEMEX, Rinker Materials, and Sterling Asphalt) have leased the northwest portion of the Site since the mid-1990s and has operated this portion of the Site as an asphalt batch plant through the present.

Numerous investigations were completed at the Site between 1991 and 2019. These prior investigations identified areas of soil, groundwater, and soil vapor impacts exceeding Washington State Model Toxics Control Act (MTCA) cleanup levels and sediments exceeding Sediment Management Standards (SMS) cleanup levels for certain chemicals.

On January 2, 2008, JELD-WEN and Ecology entered into Agreed Order No. DE 5095 to prepare an RI/FS and Cleanup Action Plan (CAP) for the Site, consistent with MTCA (Chapter 173-340 Washington Administrative Code [WAC]) and SMS (Chapter 173-204 WAC) requirements. The findings of this 2020 Revised Draft RI/FS are summarized below.

Upland RI Findings

The upland RI identified the primary sources of upland contamination to be generally associated with three historical Site operations areas: fuel oil storage and pole treating using creosote on the eastern edge of the Site and below West Marine View Drive (Creosote Area), wood surface treating using Woodlife wood treatment solution in the northeast corner of the Site (Woodlife Area), and historical filling activities in the southern portion of the Site (Knoll Fill Area). Soil and groundwater impacts associated with these source areas were characterized in the upland RI.

Additional potential isolated source areas that were identified in the October 2016 RI/FS have subsequently been further assessed and proposed cleanup of the isolated areas identified in the October 2016 RI/FS were not carried forward to the FS in this 2020 Revised RI/FS report. A summary of assessment areas is presented on Table ES-1.

Creosote Area

Pole treating activities were conducted in the Site uplands by National Pole Company prior to the 1940s. By the mid-1940s the Site was operated by Nord Door as a stile and rail door plant. The Nord Door facility operated an oil-fired boiler on the eastern portion of the Site prior to 1957. Former fuel oil aboveground storage tanks (ASTs) were located in the eastern portion of the Site along West Marine View Drive and also further to the west, beneath what is now the southern portion of the main manufacturing building. These ASTs were removed in the mid-to late-1950s.

The former pole treating activities and fuel oil ASTs are considered primary sources of total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbon (cPAH), semi-volatile organic compound (SVOC), and volatile organic compound (VOC) (naphthalene and benzene) contamination to soil and groundwater at the Site. Upland areas with elevated concentrations of these chemicals occur along the eastern portion of the Site, extending beneath West Marine View Drive, at depths generally between 3 and 15 feet below ground surface (bgs), except for areas of the former creosote tank operations (eastern portion of the existing warehouse) where impacts have been identified to approximately 50 feet bgs. The fuel oil and creosote impacts are primarily located below buildings or pavement. Groundwater data collected during the RI/FS shows no migration of groundwater contaminants associated with fuel oil or creosote to surface water or sediments.

Commented [AM(1]: Need to change and careful with language. We have detected COCs in the shoreline wells when measured with low level methods, such as cPAHs. Also, napthalene, TPH are detected at these wells but at a level that may not be actionable concern for surface water or sediment. However, the migration pathway is complete.

The former pole treating activities and fuel oil ASTs are also considered primary sources of naphthalene contamination measured in soil gas at the Site. Upland areas with elevated concentrations of naphthalene in soil gas occur beneath the eastern portion of the existing former main manufacturing building or paved parking areas.

Woodlife Area

An approximately 10,000-gallon AST containing Woodlife wood treatment solution (which contained pentachlorophenol [PCP]) was formerly located northeast of the main manufacturing building. The use of the Woodlife AST was discontinued prior to JELD-WEN's purchase of the Site in 1986, and the AST was removed in 1991. The former Woodlife storage and use area was identified as a historical source of dioxins/furans and PCP impacts to soil and groundwater at the Site. Elevated concentrations of these chemicals were generally limited to shallow depths (from the surface down to 5 feet bgs) and are also primarily located beneath buildings or pavement in the eastern corner of the Site. Groundwater data collected during the RI/FS shows no migration of dioxins/furans to surface water or sediments; however, assessment of a stormwater sump in the North Truck Dock identified groundwater weep holes that potentially introduced localized impacts to the adjacent soil, surface water or sediments.

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Knoll Fill Area

Lands west of the BNSF railroad were created by filling of the tidal delta at the confluence of Snohomish River and Possession Sound. The earliest fill records are not available; however, historical aerial photographs show filling activity along the shoreline to the south of the former Nord Door facility from at least 1938 through the late 1970s. Between 1955 and 1967, a majority of the southern portion of the Site had been cleared and filled. Additional fill activities occurred between 1967 to 1978 that included development of the southern shoreline to its current extent and additional fill in the Knoll Area to create the existing “knoll” feature.

Due to the nearshore area adjacent to the Knoll Area being identified as an area of sediment impacts for polychlorinated biphenyls (PCBs), upland investigations were conducted in the Knoll Area. Groundwater from monitoring wells as well as in groundwater seeps measured Total PCB congeners above groundwater PCLs. Soil sample analytical results for Total PCB congeners do not seem to indicate the current bank or surface soil (0-12 feet bgs) in the Knoll Area to be a source of the PCBs in the groundwater. Surface soils before 1967 to 1978 fill activities (now saturated soils below 12 feet) may have been contaminated with PCBs. Results from the SPME sampling indicate groundwater PCBs do not seem to be a source to sediments contaminated with PCBs rather sediment PCBs could be a source of PCBs in knoll area groundwater due to tidal mixing.

The RI demonstrated that potential exposure pathways to upland Site contaminants are limited to current and future industrial workers and current and future construction workers with the Knoll Fill Area groundwater contaminants addressed with the marine sediment FS alternatives.

Marine Sediment RI Findings

Chemicals of concern identified in Site marine sediments are primarily defined by PCBs and dioxins/furans. The extent of PCBs and dioxins/furans were used to define the site boundary. Wood and cPAHs have also been identified as contaminants of potential concern although they are not used to define the Site.

Elevated concentrations of total PCBs were detected in surface sediments in tidal mudflats adjacent to the undeveloped Knoll Area at the southeastern corner of the Site. Sampling of Site upland soils and exposed bank has not revealed a source of PCBs to the marine area. Groundwater and porewater sampling have also not identified a source or complete transport pathway to sediments. Fill material used to construct the uplands, the Knoll Area, and upper intertidal sediment areas, or spills prior to filling, are suspected sources of the PCBs characterized in the surficial sediment matrix.

Elevated concentrations of dioxins/furans were detected in surface and subsurface sediments in tidal mudflats immediately adjacent to historical and/or current stormwater outfalls draining uplands at the western end of the Site. Elevated dioxin/furan concentrations were detected at greater depths (up to 7 feet below mudline) than the total PCBs. The primary source of dioxins/furans to Site sediments is likely from former area-wide hog fuel burner emissions.

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Revise the language to explain why higher levels are found near outfalls and why higher levels are detected 7 feet below mudline.

In addition to PCBs and dioxins/furans, wood debris (as measured by total volatile solids testing [TVS]) and cPAHs are also addressed in the RI/FS. Region-wide historical wood industry operations have resulted in the presence of wood in the marine areas throughout the Everett waterfront. Creosote-treated structures have also been identified as potential sources of cPAHs, the extent of SMS chemical exceedances is generally encompassed by the extents of PCBs and dioxin/furan impacted areas. The boundary of the Site is defined by total PCBs and dioxins/furans.

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Further assessment of the wood (which may be measured by TVS, visual observation, breakdown products, or other methods) and cPAH toxic equivalency quotient (TEQ) may be required to evaluate compliance with MTCA and SMS regulations in pre-remedial design investigations or during monitoring, where required, within the marine Site boundary.

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A total of approximately 16.6 acres of tidal mudflats in the Site area exceed preliminary SMS sediment cleanup objectives for PCBs and/or dioxins/furans. Detailed radioisotope analyses revealed that sediments in these areas have been stable (i.e., minimal vertical sediment mixing) over the past 60 to 70 years. The radioisotope data also revealed that bioturbation is limited to less than 0.3 feet; however, because clams may burrow deeper than 0.3 feet, the preliminary SMS point of compliance for marine sediments at the Site is 1 foot below mudline.

Dietary ingestion of fish and shellfish is the primary exposure route through which human receptors may potentially be exposed to sediment contaminants at the Site. Potential receptors include recreational and/or tribal subsistence fishers. The ecological risk assessment concluded that there are unlikely to be risks to wildlife that forage for clams adjacent to the Site.

Upland Feasibility Study

Based on the upland RI findings and consultation with Ecology, the upland FS alternatives were developed for two assessment areas: Creosote Area and the Woodlife Area. The Knoll Fill Area is an assessment area discussed in the RI and the groundwater contaminants are addressed with the marine sediment FS alternatives.

Commented [ES(3]: Please note, based on recent developments to the knoll area CSM, the benefits of removal of PCBs from the knoll area sediment become even greater.

Upland cleanup alternatives have been prepared for each assessment area with detailed MTCA evaluations of each alternative. The MTCA evaluations included a disproportionate cost analysis (DCA) that compared the relative costs and benefits of each alternative of the assessment areas. Upland FS alternatives were developed assuming that groundwater at the Site is not a current or future drinking water source and the future use of the Site is industrial.

Creosote Area

Affected media in the Creosote Area include soil, groundwater, and soil gas. FS alternatives for the Creosote Area were developed by considering distinct areas that require cleanup action: on-property vadose zone; on-property shallow groundwater (to 15 feet bgs); on-property deep groundwater; off-property vadose zone; off-property shallow groundwater (to 15 feet bgs); and, off-property deep groundwater. Based upon the specifics of the assessment area (access, depth of contamination, potential receptors, feasibility, etc.) remedial actions retained as FS alternatives for the Creosote Area include combinations of remediation technologies. Those technologies include: sub-slab depressurization (SSD), soil vapor extraction (SVE), in-situ chemical oxidation (ISCO), in-situ bioremediation (ISB), soil removal, thermal treatment (via steam injection), and in-situ stabilization / solidification.

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Woodlife Area

Affected media in the Woodlife Area include soil and groundwater. FS alternatives for the Woodlife Area were developed by considering the horizontal and vertical delineation of impacts identified during RI sampling activities. Based upon the specifics of the assessment area (access, depth of contamination, potential receptors, feasibility, etc.) remedial actions retained as FS alternatives for the Woodlife Area include: institutional and engineering controls and soil removal.

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Knoll Area

Affected media in the Knoll Fill Area includes groundwater. Assessment of the Knoll Fill Area identified groundwater contamination by PCBs with no apparent source area in corresponding soil (0-12 feet), but recognition that the groundwater to surface water migration pathway is complete via groundwater seeps. Based upon the specifics of the assessment area (access, depth of contamination, potential receptors, feasibility, etc.) upland remedial actions were not retained as FS alternatives for the Knoll Fill Area and remedial actions protective of potential receptors to groundwater contamination identified in the Knoll Fill Area are proposed as part of the marine sediment FS alternatives.

Marine Sediment Feasibility Study

Based on the marine sediment RI findings, nine FS alternatives were developed in consultation with Ecology that range from monitored natural recovery (MNR) and source control to full removal. Except for the MNR and source control only approach, all alternatives are designed to meet the threshold criteria at the completion of construction (although a 10-year post-construction recovery period is allowed under MTCA/SMS regulations). Therefore, the highest ranked alternative relative to the MTCA/SMS DCA evaluation should be selected in the Cleanup Action Plan.

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1. INTRODUCTION

In accordance with the requirements of Agreed Order Number DE 5095 between JELD-WEN, Inc. (JELD-WEN) and the Washington State Department of Ecology (Ecology), dated January 2, 2008, SLR International Corporation (SLR) and Anchor QEA, LLC (Anchor QEA) have prepared this 2020 Revised Draft Remedial Investigation/Feasibility Study (RI/FS) Report for the former Nord Door facility located at 300 West Marine View Drive, Everett, Washington, 98201 (Site). The Site location is depicted on Figure 1-1.

1.1 OBJECTIVE AND SCOPE OF WORK

The objective of the RI/FS was to collect and evaluate sufficient information regarding potential hazardous substances to enable development of a cleanup action to be selected for the Site, consistent with Washington State Model Toxics Control Act (MTCA; Chapter 173-340) and Sediment Management Standards (SMS; Chapter 173-204) requirements. The scope of work for the RI investigations and FS development were performed in accordance with the following Ecology-approved Work Plans:

- Final Work Plan for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan (Work Plan); prepared by SLR and submitted to Ecology on October 21, 2008.
- Quality Assurance Project Plan (QAPP), Marine and Maulsby Marsh Sediment Characterization, JELD-WEN Former Nord Door Site, prepared by Anchor QEA and submitted to Ecology in June 2011.
- Phase 2 Remedial Investigation Work Plan, Addendum to Final Work Plan for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan (Phase 2 RI Work Plan); prepared by SLR and submitted to Ecology on August 9, 2011.
- Amendment to the Phase 2 Work Plan, Addendum to Final Work Plan for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan (Phase 2 RI Work Plan); prepared by SLR and submitted to Ecology on February 20, 2013.
- JELD-WEN Former Nord Door Site Sediment Quality Assurance Project Plan Addendum, prepared by Anchor QEA and submitted to Ecology on February 14, 2013.
- Draft JELD-WEN Former Nord Door Site Sediment Second Quality Assurance Project Plan Addendum – Feasibility Study Data Gaps, prepared by Anchor QEA and submitted to Ecology on August 20, 2013.
- Second Amendment to the Phase 2 Remedial Investigation Work Plan Addendum to Final Work Plan for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan; prepared by SLR and submitted to Ecology on November 7, 2013.
- 2nd Amendment to the Phase 2 Remedial Investigation Work Plan, Addendum to Final Work Plan for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan; prepared by SLR and submitted to Ecology on June 10, 2015.
- Source Control Evaluation (SCE) Work Plan to Address Data Gaps Identified in RI/FS and Draft Cleanup Action Plan; prepared by SLR and submitted to Ecology in December 2017.

- April 2019 Work Plan Addendum to the SCE Work Plan to Address Data Gaps Identified in RI/FS and Draft Cleanup Action Plan; prepared by SLR and submitted to Ecology in April 2019.
- Critical Areas Survey scope of work developed in consultation with Ecology in June 2019.

1.2 GENERAL SITE INFORMATION

The Site consists of five adjoining parcels with a combined land area of approximately 55 acres, which includes approximately 36 acres above the tidal mudflats. For the purposes of this RI/FS, the Site is defined as the former operating areas (i.e. former Nord Door site), on-property refers to the JELD-WEN historically owned property (former operating areas and Knoll Area), and off-property refers to off-site areas including West Marine View Drive, the Burlington Northern Santa Fe (BNSF) right-of-way (ROW) and Maulsby Marsh, as well as other surrounding properties where contaminants potentially associated with historical activities have been identified. Other property owners associated with the upland areas of the Site include BNSF, the City of Everett, and the current property owner Ron Woolworth. Owners of surrounding tidal mudflat areas include Wick Family Properties LLC, Port of Everett, and Foss Redevelopment. Administrative aspects of the Site are summarized below:

Site Name: Jeld-Wen / Former Nord Door Facility

Site Address: 300 West Marine View Drive

City and State: Everett, WA 98201

County: Snohomish

Township/Range/Section: Section 7, Township 29N, Range 5E of the Willamette Meridian

Latitude: 48º 00’ 49.5”

Longitude: 122º 12’ 34.5”

Ecology Facility Site ID Number: 2757

Ecology Region: Northwest Region

Ecology Project Manager: Mahbub Alam, Ecology, Toxics Cleanup Program

Ecology Project Coordinator: Sandra Caldwell, Ecology, Toxics Cleanup Program

JELD-WEN Project Coordinator: Dwayne Arino, JELD-WEN

JELD-WEN Project Manager: R. Scott Miller, SLR

JELD-WEN Sediment Project Manager: Nathan Soccorsy, Anchor QEA

2. SITE DESCRIPTION AND ENVIRONMENTAL BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The Site is located at the confluence of the Snohomish River to the north and Port Gardner Bay (Possession Sound) to the west (Figure 1-1). The Site consists of five adjoining parcels (29050700100400, 29050700101200, 29050700400100, 29050700401900, and 29050700402000) with a combined land area (both in-water and upland) of approximately 55 acres.

The structures currently located on the former Nord Door portion of the Site include the following: the main manufacturing building, an office building, a training center building, a maintenance warehouse, a planer building, and two dry kiln buildings (Figure 2.1-1). These buildings have been subject to significant weathering and are not currently occupied. In addition, machinery including a hog fuel bin and other pieces of equipment (most seems to have reached design life) remain outside the northwest portion of the main manufacturing building.

The buildings and surrounding paved areas on the former Nord Door portion of the Site are currently leased to industrial tenants. The former main manufacturing building located on the eastern portion of the Site has remained primarily vacant, with intermittent use as a storage facility. The northeastern portion of the Site (approximately 6.1 acres) is currently leased to Cadman. The Cadman (leased) portion of the Site operates as an asphalt batch plant. The main structures on this portion of the Site include an approximately four-story asphalt building, feeder shed, and a conveyor system. Numerous aggregate piles are located around the perimeter of the Cadman portion of the Site. A conveyor system connects from the barge dock located at the north end of the Site to the aggregate piles. Aggregate is transferred via wheel-loader from the storage piles to feeders located on the north side of the plant. The feeders convey aggregate to the dryers and mixing towers. These features are shown on Figure 2.1-1.

An approximately 2-acre vegetated knoll is located at the southern end of the Site. The “Knoll Area” was created through several apparent filling operations, initially being filled to match the surrounding grade in the early to mid-1960s. Additional fill material was placed during the 1970’s which created the existing “knoll” feature.

Surface water in the Site vicinity is utilized both commercially and recreationally. The Tulalip Tribes Reservation is located approximately one mile north of the Site, on the north side of the Snohomish River. Tulalip tribal members living on the Tulalip Reservation are engaged in both commercial and subsistence fishing near the confluence of Port Gardner Bay and the Snohomish River. There is no current or proposed future use of groundwater in the Site vicinity.

The Site is bound to the east/northeast by vacant land and tidal mudflats owned by the Port of Everett; to the west by tidal mudflats owned by Wick Family Properties LLC (formerly Wick Towing), Port of Everett, and Foss Maritime Company LLC; to the southeast by West Marine View Drive (City of Everett), beyond which is the BNSF railway and vacant marshland (Maulsby Marsh) owned by BNSF; and to the north/northwest by Port Gardner Bay. The surrounding tidal mudflat parcels contain piling and creosote-treated structures that were not used by the Former Nord

Door operations but nonetheless are considered part of the Site. Surrounding parcels and property owners are shown on Figure 2.1-2.

The Site lies on an area of fill that extends into Port Gardner Bay. The Site is relatively flat, with a maximum elevation of approximately 15 feet above mean sea level (aMSL) while the Knoll Area extends to approximately 26 feet aMSL. The tidal mudflats and a portion of the upland areas of the Site lie within the 100-year flood plain.

The future use of the Site property is expected to be industrial.

2.2 SITE HISTORY

The Site is built upon fill material placed in various stages beginning in the late 1800s. Areas on the eastern, northern, and southern sides of the Site were filled in various stages beginning in the late 1800s or early 1900s when the adjacent BNSF railroad, formerly Great Northern Railroad, was laying tracks along Port Gardner Bay. Historical activities at the Site have included casket manufacturing, pole treating, wood door and sash manufacturing, and fish net storage. As discussed above, the Knoll Area was initially filled in the early to mid-1960s.

Prior to JELD-WEN's ownership, the Site had been in use as a stile and rail door plant since the mid-1940s by Nord Door. Prior to the 1940s, National Pole Company operated a pole treating plant on the eastern portion of the Site. Sound Casket Manufacturing operated a wood casket factory on the southern portion of the Site from at least 1936 until sometime prior to 1947, at which time the casket facility was operated by Northwestern Lumber & Manufacturing Co., Inc. By 1976 some of the structures associated with the former wood casket plant had been incorporated into the Nord Door facility. A rectangular fish net storage building and several smaller structures were present on the far southern portion of the Site (current Knoll Area), south of the casket facility, from at least 1947 through 1955. The structures were no longer present in 1967, by which time the area had been further filled creating the "knoll" feature.

Based on a review of historical aerial photographs and Sanborn maps (Appendix A), it appears that the original boiler for the Nord Door facility was an oil-fired boiler located near Norton Avenue (now West Marine View Drive). The 1955 aerial photograph and the 1957 Sanborn Map show that the former pole treating plant had been removed from the Site and the boiler for the Nord Door facility was a wood-fired boiler. Sometime prior to 1968, the wood-fired boiler was moved to its current location in the center of the Site adjacent to the main manufacturing building (Figure 2.1-1).

JELD-WEN acquired certain assets, including the real property of the Nord Door plant, in May 1986. Operations associated with the Nord Door stile and rail door plant included buying rough green wood, sorting, stacking, drying, planing, and cutting the lumber. The finished wooden doors, rails, posts, columns, and spindles were assembled on-site.

JELD-WEN ceased operations at the Nord Door plant in 2005. Various asphalt companies (Cadman [current], CEMEX, Rinkers Materials and Sterling Asphalt) have leased the northeast portion of the Site since the mid-1990s and operated this portion of the Site as an asphalt batch plant. Aerial photographs depicting the Site in 1947, 1955, 1965, 1974, 1984, and 1995 are provided as Figure 2.2-1 through Figure 2.2-6, respectively. Historical features identified on

Sanborn maps have been noted on the historical aerial photograph figures. Copies of the Sanborn Maps and aerial photographs are included as Appendix A.

2.3 PRIOR ENVIRONMENTAL INVESTIGATIONS

Numerous pre-RI investigations were conducted at the Site between 1991 and 2008, the findings of which were summarized in detail in the Work Plan (SLR, 2008). Appendix B contains an excerpt from the Work Plan summarizing the Regulatory History and Prior Investigations performed at the Site. Identified areas of impact at the Site included: creosote and polycyclic aromatic hydrocarbons (PAHs) from historical pole treating operations at the east side of the facility and beneath West Marine View Drive; PAHs and total petroleum hydrocarbons (TPH) from historical fueling oil storage at the east side of the facility; shallow soil and groundwater impacts from thinner storage (toluene) at the northeast corner of the facility; pentachlorophenol (PCP) impacts to soil from wood treatment solution (Woodlife) storage and usage at the northeast corner of the facility (appeared to be localized); TPH and PAH impacts to soil near the former fueling station in the central portion of the Site; PAH impacts to soil near the former casket manufacturing area; PAH impacts to soil near monitoring well MW-1; and, PAH and TPH from fill material placed at the Site (appeared to be wide-spread but relatively minor). Pre-RI sample locations are included on Figure 2.3-1 and pre-RI analytical results are included on the data summary tables discussed in Section 4.1. A summary of laboratory analyses conducted on each sample (pre- and post-RI) is presented in Table 2.3-1.

3. ENVIRONMENTAL SETTING/PHYSICAL CHARACTERISTICS

This section summarizes the topography, climate, geology, hydrogeology and ecology of the Site area.

3.1 TOPOGRAPHY

The Site is located on a peninsula of fill which extends into Port Gardner Bay. Surface features at the Site include numerous buildings, asphalt and concrete paved areas, and unpaved graveled or grassy areas (primarily the Knoll Area). Approximately 95% of the Site is currently paved or covered by buildings. The Site is adjoined by waterways and/or tidal mudflats to the north, south, and west. A narrow channel separates the Site from the adjoining property to the northeast. The Site is relatively flat, with a maximum elevation of approximately 15 feet aMSL. The Knoll Area extends to approximately 26 feet aMSL.

The northeastern, northwestern, and southern shorelines of the Site are currently armored with relatively large asphalt, concrete, and riprap materials which slope steeply downward to the tidal flats. Pockets of dune grass are located between rubble and scattered along relatively thin bands along the shoreline, including at the base of the riprap.

3.2 GEOLOGY AND HYDROGEOLOGY

The Everett area lies within the Puget Sound lowland, a tectonic/geomorphic depression between the Olympic Mountains and the Cascade Range. The north-south trending depression extends from Oregon to southwestern British Columbia. The depression is characterized by relatively thick accumulations of post-glacial and glacial deposits overlying tertiary sedimentary and igneous rocks. The lowlands area has been influenced by at least five major advances and several lesser advances of Pleistocene continental ice. Glacial deposits consist of a complex sequence of lacustrine deposits, advance outwash, drift, till, and recessional deposits. A variety of river deposits characterize the interglacial periods. The Quaternary glacial and interglacial deposits range in thickness from 0 to 300 feet in the Site vicinity (Yount et al., 1985). The underlying bedrock consists primarily of tertiary sedimentary and volcanic rocks.

The Site is underlain by Holocene-age younger alluvial and estuarine deposits (Minard, 1985), which consists mostly of stream-laid stratified sediments. These deposits lie in and along the present streams near the water table. The sediment is largely sand, silt, and clay with considerable amounts of organic matter. The thickness of these deposits probably exceeds 90 feet.

According to the Soil Survey of Snohomish County Area, Washington (National Resource Conservation Service [NRCS], 1983) upland soils at the Site are classified as Urban Land. Urban Land is defined as areas that are covered by streets, buildings, parking lots, and other structures that obscure or alter the soils so that identification is not possible. Soils at the Site are likely classified as Urban Land as a result of the historic filling activities. Soils encountered at the Site consist primarily of sands and silts, with interbedded layers of woody debris. Borings installed on the Site encountered organics consisting of shells and shell pieces. Test pits and borings completed in the Knoll Area consisted primarily of sandy fill material with shells and shell pieces down to the native mudflat layer. Evidence of general fill material was encountered at some test pits completed near the center of the Knoll Area (concrete, etc.). Saturated soil at the Site was encountered at depths ranging from 3 to 10 feet bgs.

Depth to groundwater across the Site has been measured between 2.5 and 12 feet bgs, with an average depth of approximately 6.5 feet bgs. Groundwater flow is generally toward Port Gardner Bay to the west/northwest; however, groundwater gradient on the edges of the peninsular fill area have been found to be tidally influenced.

3.3 CLIMATE

The Site is located in the west-central portion of Snohomish County. The climate of the Snohomish County area is tempered by winds from the Pacific Ocean. The average daily temperature in Everett in the summer is 62 degrees Fahrenheit and in the winter is 40 degrees Fahrenheit. Snow and freezing temperatures are uncommon. Summer rainfall is generally infrequent and light. During the rest of the year, rains are frequent, especially late in fall and in winter. The average annual precipitation in Everett is 36 inches (NRCS, 1983).

3.4 SEA LEVEL RISE PREDICTIONS

Global climate change is projected to result in sea level rise and increased storm intensity in the Everett area. This sub section summarizes a more detailed evaluation of the effects of climate change and projected sea level rise that is presented in Appendix C. To assess the potential effect at the Site, Ecology guidance (Ecology 2017), relatively recent Everett-specific projections (Miller et al, 2018), and Federal Emergency Management Agency (FEMA) flood plain information were reviewed to determine Site-specific projections and evaluations to inform the future environmental setting and considerations relative to remediation. The Site is relatively flat with a top-of-bank elevation of approximately 12- to 14-feet Mean Lower Low Water (MLLW; used here as a datum).

Current Tidal Datums for NOAA Station 9447659 (Everett, WA)

Tide	Tide Level (feet MLLW)
Mean Higher High Water (MHHW)	11.09
Mean High Water (MHW)	10.21
Mean Tide Level (MTL)	6.51
Mean Sea Level (MSL)	6.48
Mean Low Water (MLW)	2.8
Mean Lower Low Water (MLLW)	0

Source: Center for Operational Oceanographic Products and Services; NOAA Tides & Currents

Everett-specific sea level rise projections consider low and high scenarios using a Representative Concentration Pathway (RCP) methodology. In the low estimate greenhouse gases are projected to stabilize by mid-century and decrease thereafter while the high scenario projects continued increase in greenhouse gasses until the end of the 21st century (Mauger 2015). In addition to sea level rise the projections include vertical land movement of -0.1 ± 0.2 feet per century. The Site-specific low and high projections are as follows:

- Low Greenhouse Gas Scenario (RCP 4.5): By mid-century, the sea level is projected to rise between 0.5- and 1-foot. By the turn of the century and shortly thereafter, up to 3 feet of rise is projected.
- High Greenhouse Gas Scenario (RCP 8.5): By mid-century, the sea level is projected to rise between 1- and 2-feet. By the turn of the century and shortly thereafter, up to 5-feet of rise is projected.

The potential for midcentury sea level rise of 1 to 2 feet (RCP 8.5) results in new MHHW level at elevation up to 14 feet. Projections for sea level rise at the turn of the century of 5 feet would result in MHHW elevation over 16 feet. Figure 3.4-1 depicts elevation contours of 13, 15, and 17 feet MLLW to reflect 2, 4, and 6 feet of sea level rise to depict the range of sea level rise by adding projected rise to current MHHW elevation. With the projections defined, the Ecology guidance (Ecology 2017) was assessed to determine potentially relevant interpretations. The Ecology guidance presents three categories that could potentially apply to the Site.

Ecology guidance (Ecology 2017) includes low risk, short-term risk, and long-term/high risk scenarios to account for climate change-related criterion. Based on the Site-specific projections, the selected remedy will need to be assessed relative to the applicable scenario to determine if any climate change-related data needs are required to be developed and assessed in remedial design. In addition to the Ecology guidance FEMA projections should also be considered when determining risks of inundation.

3.5 UPLAND ECOLOGY

Information regarding federal- and state-listed sensitive, monitored, and candidate Endangered Species Act species was sought from the Washington Department of Fish and Wildlife (WDFW) Priority Habitat Species (PHS) list data. Habitats and species maps obtained from the WDFW are included in Appendix D. No federally listed endangered species were identified in the vicinity of the Site.

The purple martin is listed as a State candidate species on state lists. Three nesting pairs were identified at the Everett waterfront, at the confluence with the Snohomish River (Appendix D). These pairs were identified as active in 2004. Purple martins are large insect-eating, colonial nesting swallows that nest in a variety of cavities. Purple martins most commonly feed in flight on insects. Favorable martin foraging habitat includes open areas, often located near moist to wet sites, where flying insects are abundant.

In addition, the bald eagle, which is listed as a federal species of concern and a State sensitive species, may be found near the Site. No nesting bald eagles have been observed on the Site; however, the Site is located within the 800-foot shoreline nest buffer. The closest nesting territory (Hale #506-2) is located approximately one-quarter mile southeast of the Site (Appendix D). Wintering bald eagles require perch trees for day use and mature/old-growth forest stands for night roosts. Perch trees are typically dominant live or dead trees situated near a shoreline where a nest or defendable territory is evident or a prey source is abundant. Prey items are primarily fish and waterfowl.

3.6 MARINE ECOLOGY

In the summer of 2019, a scope of work to conduct a critical areas evaluation was developed in consultation with Ecology. The field work was implemented in July and reported to Ecology in the August 2019 Critical Areas Report (CAR; Appendix D.2). The CAR characterized ecological conditions in the study area to allow for the avoidance, minimization, and mitigation of impacts related to future cleanup activities. Existing critical areas and associated regulated buffers identified in the CAR were addressed as defined in Chapter 19.37 of the Everett Municipal Code (EMC; City of Everett 2019a).

During the investigation, 14 estuarine wetlands were identified and delineated within the study area (Wetlands E1 through E14). As described in the CAR, most of the estuarine wetlands are small patches or groups of small patches of salt-tolerant vegetation near the marine ordinary high water mark (OHWM), and 8 of the 14 wetlands are less than 100 square feet in total area. No freshwater wetlands or stream critical areas were identified within the study area. A delineation of the OHWM of the marine shoreline of Port Gardner Bay in the study area was performed. The OHWM delineation also included a delineation of piles and derelict structures within the study area below the OHWM. Under EMC Chapter 19.37.190, the Port Gardner Bay shoreline is defined as a Fish and Wildlife Habitat Conservation Area (FWHCA) under the category of “habitats of primary association.” Figure 3.6 depicts the location and extent of identified wetland areas, OHWM elevation, and pile/derelict structures locations.

In accordance with State regulations, the City of Everett manages a Shoreline Master Program (SMP). The SMP is submitted for review and approval on an 8-year cycle for State review and approval to ensure shorelines are managed in compliance with applicable regulations. The most recent SMP was approved in October 2019 and is accessible online (https://everettwa.gov/553/Shoreline-Master-Program). The SMP divides shoreline areas into seven Ecological Management Units (EMU) and the Site is within Lower Snohomish Channel as EMU 5. The SMP summarizes historical use and modifications to the Everett shoreline in addition to identifying shoreline designations.

A summary of permitted, conditional, and prohibited shoreline uses and shoreline modification activities for each shoreline designation is presented in SMP Table 1 and Table 2, respectively. The uplands of the Site are designated as Urban Industrial. The tidal mudflats south of the Site are designated as “Urban Maritime Interim.” The inlet and Maulsby Marsh (referred to as Maulsby Swamp in the SMP) are designated as Aquatic Conservancy[1]. Selection of future Site remedial activities should identify permitted, conditional, and prohibited shoreline uses of SMP-defined designations and determine if data needs associated with such designations are addressed in the remedial design.

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[1] The SMP defines an Aquatic Conservancy as follows: *“The “Aquatic Conservancy” shoreline environment designation is applied to areas that scored highly for salmonid habitat in the 2001 Snohomish Estuary Wetland Integration Plan Salmon Overlay.”*

On a bay-wide scale, information regarding listed and candidate Endangered Species Act fish species in the project area was sought from the WDFW (Appendix D). There are no federally listed endangered fish species identified in the project area. Federally listed threatened species (also noted as State candidate species) that may be found in the Snohomish River near the Site include the Coho salmon, Dolly Varden/bull trout, fall Chinook salmon, fall chum, pink salmon, resident cutthroat, sockeye salmon, summer Chinook salmon, and summer steelhead, which may migrate through the area during certain periods of the year.

No surf smelt, sand lance, rock sole, or herring spawning areas were identified in the Site area (Appendix D). Dungeness crab is included as a priority species in WDFW's PHS list. Dungeness crab habitat was identified in areas surrounding the Site (Appendix D).

4. REMEDIAL INVESTIGATION

Prior to initiating the RI/FS in 2008, earlier investigations of upland areas of the Site had identified an area impacted by historic fuel oil and creosote releases (see Appendix B). This area is located in the east/southeast portion of the Site and beneath West Marine View Drive. The primary focus of the RI was to assess other data gaps identified by JELD-WEN and Ecology that warranted further investigation prior to completion of the FS. Areas of the Site evaluated as part of the RI included the following:

- Hog fuel burner ash, a potential source of dioxins and furans;
- A former Woodlife wood treatment solution storage and use area;
- A formerly unpaved storage area in the southwest portion of the Site;
- A formerly unpaved barrel storage area in the south-central portion of the Site;
- A former casket manufacturing area in the southern portion of the Site;
- A former machine shop/maintenance area in the central portion of the Site;
- Surface soils adjacent to seven on-site transformers;
- A former fish net storage area and Knoll Area in the southern portion of the Site;
- Groundwater in the existing groundwater monitoring wells;
- Soil, groundwater, and sediment conditions on the BNSF railroad property/Maulsby Marsh to the east of the Site;
- Sediment in the tidal mudflats immediately adjacent to the Site uplands;
- Sub-slab soil gas beneath the existing warehouse;
- Stormwater conveyance system (including North Truck Dock sump);
- Deep zone groundwater in the eastern portion of the Site;
- Additional assessment of the Knoll Area; and,
- Groundwater seeps around the shoreline of the Site.

The initial RI investigation was completed between May and October 2009 and was performed in conformance with the Ecology-approved Work Plan (SLR, 2008). On November 20, 2009, JELD-WEN submitted an Initial RI Investigation Data Summary Report (SLR, 2009) to Ecology. This document contained a preliminary summary of RI field activities, data results, and identified data gaps that warranted further investigation.

To address the data gaps identified in the Initial RI, JELD-WEN prepared a Phase 2 RI Work Plan (SLR, 2011) to address upland areas of concern, and also contracted with Anchor QEA to further characterize the tidal mudflats and Maulsby Marsh areas immediately adjacent to upland areas of the Site. The scope of work for the sediment assessment was outlined in the Quality Assurance Project Plan (QAPP; Anchor QEA, 2011).

Findings of the Phase 2 Upland RI were summarized in a report provided to Ecology which found that the additional assessment was sufficient to complete characterization of upland impacts in all areas except dioxins/furans in the former Woodlife storage and use area. An amendment to the Phase 2 RI Work Plan was submitted in February 2013 (SLR, 2013a) for additional characterization of dioxin/furan impacts in the Woodlife storage and use area. The findings of the investigation were summarized in a Summary Report for Additional Upland Assessment (SLR, 2013b).

In November 2013, a Second Amendment to the Phase 2 RI Work Plan (SLR, 2013c) was submitted to Ecology which provided for upland soil exploration and soil and groundwater sampling to evaluate the fill material present in the Knoll Area. In addition, another amendment to the Phase 2 RI Work Plan was submitted to Ecology to further assess the vertical extent of contamination in the historical fuel oil/pole treating area, the horizontal extent of the fuel oil/pole treating area impacts to the north and south, and the vapor intrusion pathway using soil gas sampling (SLR, 2015). The findings of these investigations were incorporated into the October 2016 Draft RI/FS report.

Upon review of the October 2016 Draft RI/FS report, additional assessment of the existing groundwater monitoring wells, the stormwater conveyance system (including the North Truck Dock), and groundwater seeps was completed as part of a Source Control Evaluation (SCE). Further assessment was completed to address data gaps identified by Ecology in the SCE activities, including additional assessment of groundwater monitoring wells (including deep zone groundwater monitoring wells) and further assessment of the Knoll Fill Area.

In addition, quarterly groundwater monitoring was performed at existing and newly installed groundwater monitoring wells beginning in 2015. JELD-WEN requested, and Ecology approved, a change to semiannual groundwater monitoring beginning in 2020. Monthly product measurement and extraction has been performed at deep zone well MW-8B. DNAPL that accumulates in the sump is removed with a hand bailer and stored in 55-gallon drums pending off-site disposal with other investigation derived waste. Removable DNAPL has not been observed at any other shallow or deep groundwater monitoring well.

Phase 2 RI - Marine Sediments

A series of data review meetings between JELD-WEN and Ecology were conducted between 2009 and 2014 that led to agreements to perform successive rounds of sediment sampling and analysis to complete the RI. The scope of the supplemental sampling is described in three Addendums to the Phase 2 RI Work Plan Sediment QAPP (Anchor QEA 2013a; Anchor QEA 2013b, Anchor QEA 2014). Validated sediment/tissue sampling and analysis data from the Phase 2 RI marine investigations have been uploaded to Ecology's Environmental Information Management (EIM) system.

Phase 2 RI - Maulsby Marsh

Maulsby Marsh sediment sampling and analysis data were uploaded to Ecology's EIM system following validation. However, based on Ecology's review of the data, it was determined that chemicals of concern detected in the marsh sediments were not attributable to Site releases. Therefore, no additional analysis of this area was required for the RI/FS, and archived samples were disposed at the direction of Ecology. A summary of Maulsby Marsh sediment results is presented in Appendix E.

4.1 UPLAND INVESTIGATIONS

Upland RI investigations were conducted at the Site between 2009 and 2019. A summary of laboratory analyses conducted on each sample from the upland investigation is presented in Table 2.3-1. A summary of the analytical findings are presented in Table 4.1-1 (soil) and Table 4.1-2 (groundwater). Analytical results of all upland soil, groundwater, and soil gas samples discussed below are presented in Table 4.1-3 through Table 4.1-11 (soil), Table 4.1-12 through Table 4.1-20 (groundwater), and Table 4.1-21 (soil gas). Upland sample locations are presented on Figure 2.3-1 and soil boring and test pit logs are provided in Appendix F.

4.1.1 SUMMARY OF UPLAND SAMPLING INVESTIGATIONS, METHODS, AND LOCATIONS

This section summarizes the various upland investigations including a description of the completed sampling activities and the areas of interest for the investigations. Additional discussion concerning the results from the primary assessment areas (Creosote Area, Woodlife Area, and Knoll Fill Area) are included in Section 5.

4.1.1.1 INITIAL RI INVESTIGATION

In May and June, 2009, an initial RI investigation was completed at the Site including 13 direct push (Geoprobe) borings for the collection of soil and grab groundwater samples (GP-302 through GP-312, GP-334 and GP-335), surface and near surface soil sampling with a hand auger (SS-313 to SS-321) and sampling of stored ash material from a drum (SS-301) at the locations depicted on Figure 2.3-1. In addition, 12 locations (HA-322 to HA-333) adjacent to Maulsby Marsh and BNSF property were selected for soil and grab groundwater sampling with a hand auger and temporary well points in September and October 2009 to address potential impacts to Maulsby Marsh. In October 2009 a round of groundwater samples was collected from existing monitoring wells MW-1 through MW-6.

4.1.1.2 PHASE 2 UPLAND SOIL AND GROUNDWATER INVESTIGATION

Based on the findings of the initial RI, pre-RI sampling conducted at the Site, and a series of communications with Ecology, several upland areas were identified as warranting additional characterization. In May 2011, SLR completed five additional Geoprobe borings for the collection of soil and grab groundwater samples (401-P through 405-P) at the locations depicted on Figure 2.3-1 and collected additional groundwater samples from existing groundwater monitoring wells at low tide and high tide in accordance with an Ecology-approved Work Plan (Phase 2 RI Work Plan, SLR, 2011).

The findings of this investigation were deemed sufficient, at that time, to complete characterization of upland impacts at the Site for completion of the RI/FS and draft CAP in all areas except the former Woodlife Storage and Use Area.

4.1.1.3 ADDITIONAL UPLAND ASSESSMENT – FORMER WOODLIFE AREA

In March 2013, SLR conducted an additional investigation of the former Woodlife storage and use area to further characterize dioxin/furan impacts in this area of the Site. The investigation included the completion of 12 soil borings (GP-501 to GP-512) for the collection of soil and grab groundwater samples. Three soil samples were collected from each boring at depths of 1 foot, 3 feet, and 5 feet bgs. One groundwater grab sample was collected from a temporary well installed at each boring. Sample locations are presented on Figure 2.3-1.

The soil and groundwater sampling completed in March 2013 was sufficient to characterize the horizontal and vertical extent of dioxin/furan impacts in the Former Woodlife Area in soil and groundwater at upland areas of the Site for the purpose of the RI/FS.

4.1.1.4 ADDITIONAL UPLAND ASSESSMENT – KNOLL AREA

Marine sediment investigations conducted between 2009 and 2013 identified PCBs as a contaminant of potential concern (COPC) in sediment near the Knoll Area. In November 2013, nine test pits (TP-10 through TP-18) were completed to evaluate the fill material in the Knoll Area and four Geoprobe borings (GP-601 through GP-604) were completed to evaluate groundwater in the Knoll Area (see Figure 2.3-1). Test pits were completed to depths of approximately 5 to 15 feet bgs and Geoprobe borings were completed to a maximum depth of 40 feet bgs.

4.1.1.5 ADDITIONAL UPLAND ASSESSMENT – CREOSOTE AREA

In December 2013, three Geoprobe borings (GP-605 to GP-607) were completed to further evaluate the horizontal and vertical extent of soil and groundwater impacts in the Creosote Area (see Figure 2.3-1). Borings were advanced to a depth of 34.5 feet bgs and groundwater samples were collected in temporary wells.

4.1.1.6 ADDITIONAL UPLAND ASSESSMENT – HISTORICAL FUEL OIL/POLE TREATING AREA, VAPOR INTRUSION PATHWAY, AND GROUNDWATER ASSESSMENT

In August 2015, SLR conducted additional assessment activities based on discussions with Ecology regarding the interim RI/FS report to further assess three items: 1) the vertical extent of contamination in the Creosote Area; 2) the horizontal extent of contamination in the Creosote Area; and, 3) the vapor intrusion pathway to the existing main manufacturing building using soil gas sampling.

In July and August 2015 soil and groundwater samples were collected from temporary Geoprobe locations to assess the depth and extent of impacts to the east of the Site (four deep borings, GP-701 to GP-704, adjacent to West Marine View Drive), underneath the existing main manufacturing building (three deep borings, GP-708 to GP-710, and two shallow borings, GP-711 and GP-712), and to the southeast of the existing main manufacturing building (three shallow borings, GP-705 to GP-707). Deep borings were extended up to 55 feet bgs and shallow borings were extended to approximately 11 feet bgs. The completed depths were based on field conditions encountered at the time of the investigation.

Soil gas samples from beneath and adjacent to the existing main manufacturing building were collected to support the assessment of the vapor intrusion pathway. Nine locations were selected for shallow soil gas sample collection from the area below the existing surface (concrete or asphalt). Soil gas samples were collected above the groundwater table encountered at the time of the field work (encountered at approximately three and a half feet bgs). Soil gas sample points were installed with a Geoprobe direct push drilling rig utilizing a post-run tubing system designed for collection of soil gas samples.

Based on the findings of the Geoprobe soil and groundwater investigation, seven groundwater monitoring wells were installed with a hollow-stem auger drilling rig at locations and depths presented to Ecology (SLR, 2015). One set of nested groundwater monitoring wells was completed inside the existing main manufacturing building with one well completed in the shallow zone (MW-8A screened between 4 and 14 feet bgs) and one well completed in the deeper zone (MW-8B screened between 40 to 50 feet bgs with a 2-foot sump). Two additional sets of nested monitoring wells were completed in the area east of the Site adjacent to West Marine View Drive (MW-9A/MW-9B and MW-10A/MW-10B). In addition, one shallow groundwater monitoring well was completed to the north of the existing main manufacturing building and west of the north entrance to the property to assess groundwater impacts adjacent to surface water (MW-7).

4.1.1.7 SOURCE CONTROL EVALUATION TO ADDRESS DATA GAPS

In December 2017, SLR conducted additional assessment activities based on data gaps identified during Ecology initial review of the October 2016 Draft RI/FS Report. Source Control Evaluation (SCE) activities were completed for further characterization of: 1) groundwater seeps; 2) the existing site stormwater drainage system; and, 3) the North Truck Dock (NTD) stormwater sump.

An assessment of groundwater seeps observed discharging into Port Gardner Bay on the northern, western, and southern side of the Site was completed to identify potential impacts to surface water and sediment via groundwater seep drainage from the Site. The groundwater seep assessment consisted of identification of observed seeps during low tidal conditions, visual observations from identified seeps, and groundwater seep sampling of select groundwater seep locations along the shoreline of the Site.

While door manufacturing at the Site ceased in 2005, the Industrial Stormwater General Permit for the door manufacturing operations was not terminated until March 2007 (see Attachment 5 of the SCE Work Plan). Stormwater drainage plans that were previously provided to Ecology showing the location and configuration of the Site stormwater drainage system did not match observations made by Ecology during an April 2017 visit to the Site. As a component to the SCE, an assessment of the Site stormwater drainage system configuration was completed to locate and identify current and/or historical outfalls, drainage system collection points, pipe locations, and the approximate drainage areas for the collection points (SLR, 2019a).

As part of the stormwater drainage assessment, the stormwater sump in the NTD area was traced and mapped by a utility locating service, and samples were collected of water entering the sump (via identified inlet pipes and apparent groundwater weep holes), solids inside the sump, and soil adjacent to observed current and historical discharge points on the adjacent Port of Everett property. Following the investigation, the current property owner plugged the weep holes, removed the solids from within the sump and at the bottom of the truck ramp, and re-routed the discharge line to an existing stormwater line that terminates at the inlet to the east of the Site.

4.1.1.8 ADDENDUM TO SCE WORK PLAN

In May 2019, SLR conducted a data gap assessment based on communications and discussions with Ecology following submittal of the SCE Summary Report. The data gap assessment included further characterization to address data gaps identified in the SCE activities and previous RI investigations. This included assessment of: 1) extent of existing groundwater impacts and deep zone groundwater assessment; 2) follow-up assessment of Knoll Area; 3) additional assessment of “Area 4” locations identified in the October 2016 Draft RI/FS (i.e. isolated areas of impact); follow-up assessment related to the stormwater conveyance system; and, assessment of vertical and horizontal groundwater flow and gradient (SLR, 2019b).

One additional set of nested monitoring wells (MW-11A and MW-11B) were installed near the southern corner of the main manufacturing building, and to the south of previously identified deep zone impacts. The deep well was completed to 40’ bgs with a 2-foot sump. Soil borings were completed with a Geoprobe drilling rig (composite soil samples of 0-12 feet were requested by Ecology), and monitoring wells were subsequently installed with a HSA drilling rig.

Three soil borings were completed in the Knoll Area and completed as groundwater monitoring wells (MW-12 to MW-14). Composite soil samples were collected from 0-12 feet bgs and the monitoring wells were completed to 23 to 25 feet bgs.

Two soil borings were completed at previously identified areas of isolated impacts (former borings GP-311 and GP-34). Composite soil samples were collected from 0-12 feet bgs and the soil borings were subsequently completed as shallow permanent groundwater monitoring wells MW-15 and MW-16 to approximately 13 feet bgs.

As a follow-up to the stormwater conveyance system assessment, three soil borings were completed in areas of previously identified damaged stormwater lines that were connected to identified outfalls. GP-801 and GP-802 included composite soil sampling from 0-12 feet bgs and collection of a grab groundwater sample from a temporary well. MW-17 included composite soil sampling from 0-12 feet bgs and installation of a permanent groundwater monitoring well to approximately 13 feet bgs.

To better understand the site-wide groundwater gradient (including deep zone gradient and potential vertical gradient), a transducer study was performed for two weeks in May 2019. Pressure transducers were installed at all nested well locations (shallow and deep well) and at several new and existing groundwater monitoring wells.

Three additional groundwater monitoring wells were installed to further assess PCB concentrations potentially related to fill activities in and around the Knoll Area. MW-18 was installed on the eastern edge of the Knoll Area adjacent to West Marine View Drive, MW-19 was installed between GP-801 and the shoreline, and MW-20 was installed at the northern extent of estimated fill activities associated with the Knoll Fill Area. This assessment also included SPME sampling from temporary wells installed in the mudflats adjacent to the Knoll Area and from groundwater monitoring wells installed in the Knoll Area.

4.1.1.9 GROUNDWATER MONITORING PROGRAM

Groundwater monitoring at permanent monitoring wells began on a quarterly basis in 2015. Groundwater sampling was performed per the Groundwater Monitoring Program Work Plan and SAP (SLR, 2019c) and included measurement of depth-to-water measurements and purging and sampling the monitoring wells per EPA low-flow methods. JELD-WEN requested, and Ecology approved, modifications to the analytical testing and a change to semiannual groundwater monitoring beginning in 2020. Monthly product measurement and extraction has been performed at deep zone well MW-8B. Tables presenting field measurements and analytical results from the quarterly groundwater sampling events and figures depicting examples of groundwater gradient estimates are included in Appendix G.

4.1.2 UPLAND ANALYTICAL RESULTS AND FINDINGS

An expanded summary of upland analytical results and findings, identification of Indicator Hazardous Substances (IHS), and a discussion of selected screening levels are presented in the conceptual site models for selected assessment areas (Creosote Area, Woodlife Area, and Knoll Fill Area) are included in Section 5.0 of this report.

4.1.2.1 INITIAL PRELIMINARY CLEANUP LEVEL ASSESSMENT

Commented [AM(9]: This section may need to be updated with new PCL Table.

In order to identify Indicator Hazardous Substances (IHS) and specific areas of concern to focus potential remedial actions, historical analytical results were screened against initial Preliminary Cleanup Levels (PCLs) consisting of published regulatory levels, natural background concentrations, and laboratory practical quantitation limits (PQLs). Selected initial PCLs and the PCL sources are presented on Table 4.1.2.1-1 (soil) and Table 4.1.2.1-2 (groundwater). Analytical results per analyte group with a comparison to the initial PCLs are summarized on Table 4.1-1 and Table 4.1-2 and presented on Table 4.1-3 to Table 4.1-11 (soil), Table 4.1-12 to 4.1-20 (groundwater) and Table 4.1-21 (soil gas).

Initial PCLs used to screen general analytical results were based on the following process:

- Soil initial PCLs were Method B direct contact values from MTCA for all soils to a depth of 15 feet bgs (Method A direct contact value from MTCA was used if no Method B value) or natural background concentration.
- Groundwater initial PCLs were surface water cleanup levels from MTCA, potable groundwater screening level (if no surface water cleanup value), groundwater protective of vapor intrusion (used for volatile analytes only), or the laboratory PQL.

Soil exceedances of initial PCLs include the following COPCs and areas:

- TPH-Gx and TPH-Dx (diesel range) were measured above initial PCLs at 8 and 10 sample locations, respectively. These locations were primarily located within the Creosote Area and appear to be co-located with cPAH impacts.
- cPAH TEQ values were calculated above initial PCLs at 31 sample locations. Other PAHs including 2-methylnaphthale, naphthalene, and phenanthrene were also measured above initial PCLs, however only at less than 3 locations and these exceedances were co-located with cPAH impacts.

- Dibenzofuran (an SVOC) was measured above initial PCL at 3 locations, also located within the Creosote Area and co-located with cPAH impacts.
- Naphthalene (a VOC) was measured above the initial PCL at 3 locations, also located within the Creosote Area and co-located with cPAH impacts.
- One metal (thallium) measured above the initial PCL at 9 locations. Concentrations of thallium appear to be representative of natural background concentrations and thallium is not considered a COPC.
- TEQ Dioxin/Furan values were calculated above initial PCL (based on background concentration) at 22 locations, primarily located within the Woodlife Area.

Groundwater exceedances of initial PCLs include the following COPCs and areas:

- TPH-Gx and TPH-Dx (diesel range) were measured above initial PCLs at 15 and 28 sample locations, respectively. These locations were primarily located within the Creosote Area and appear to be co-located with naphthalene impacts.
- cPAH TEQ values were calculated above initial PCLs at 34 sample locations. Other PAHs including: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene were also measured above initial PCLs. These locations were primarily located within the Creosote Area and appear to be co-located with naphthalene impacts.
- SVOCs including 1,1-Biphenyl (only 1 location), dibenzofuran, 2-4-Dimethylphenol, and 3,4-Methylphenol were measured above initial PCLs. These locations were primarily located within the Creosote Area and appear to be co-located with naphthalene impacts.
- Total PCB congeners were measured above initial PCL at 8 locations primarily within the Knoll Fill Area.
- Metals were measured above initial PCLs at select locations throughout the Site (maximum of 11 locations for arsenic). The metals concentrations do not appear to be related to historical site operations or specific assessment areas and are not COPCs.
- TEQ Dioxin/Furan values were calculated above the initial PCL at 2 locations located within the Woodlife Area.

Other isolated areas of impact above initial PCLs were identified in upland soil and groundwater but were not subsequently carried through to the FS due to the findings of additional assessment activities, including the following:

- A former equipment fueling station was located at the southeastern end of the kiln buildings. Soil boring GP-34 was completed in this area during a pre-RI investigation. TPH-Dx (heavy oil range) was identified in boring GP-34 at a concentration above the PCL. Test pit excavations (TP2-1 to TP2-4) were subsequently completed near the former fueling station extending over sampling location GP-34. Test pits were completed through the center of, and to the north, east, and south of former boring GP-34. Field evidence of impacts were identified in the location of former boring GP-34, but no impacts were observed in surrounding test pits. The test pit excavation exposed an area containing wood debris (lumber and saw dust) along with other miscellaneous waste (asphalt pieces, bottles, scrap metal) to a depth of 5 to 6 feet bgs. Four soil samples were collected from the test pit excavations and selectively analyzed for TPH, SVOCs, PAHs, and VOCs. No TPH, SVOCs, or VOCs were identified above PCLs in the confirmation samples. The soil sample collected from the central test pit, in the approximate location of boring GP-34, identified cPAHs above PCLs (note that cPAHs were not measured above the PCL in GP-34). The test pit investigation confirmed that the TPH and cPAH concentrations in soil above PCLs in the former fueling area are limited in extent and potentially unrelated to the former equipment fueling station.

Subsequent investigation during the 2018-2019 SCE included installing monitoring well MW-16 adjacent to former boring GP-34 and test pit TP-2. Analytical results for soil and groundwater at MW-16 did not identify cPAHs above the PCLs.

- cPAHs were identified in Boring GP-14 (pre-RI investigation) above the PCL. Subsequent investigations completed as part of the RI (GP-211, GP-707, and MW-11A/11B) did not identify cPAHs above the PCL and this area appears to be outside of the identified impacts in the Creosote Area.
- Naphthalene was identified above the PCL in boring GP-311 at 0.27 milligrams per kilogram (mg/kg), slightly above the PCL of 0.24 mg/kg.

  During the 2018-2019 SCE monitoring well MW-15 was installed adjacent to former boring GP-311. A soil composite sample from 0 to 12 feet bgs did not measure naphthalene above PCLs (0.0088 mg/kg). The initial PCL for naphthalene presented in this 2020 Revised RI/FS is 1,600 mg/kg based on direct exposure.
- TPH-Dx (heavy oil range) was identified in a groundwater sample from Geoprobe boring GP-24 at a concentration of 1,480 micrograms per liter (µg/L), above the PCL of 500 µg/L. No SVOCs, PAHs, or VOCs were identified in boring GP-24 above laboratory PQLs.

  Monitoring well MW-1 was subsequently installed adjacent to GP-24 and has shown no exceedances of PCLs for TPH in groundwater over several rounds of groundwater monitoring. The elevated concentration of TPH in the Geoprobe boring is anomalous and may have been the result of turbidity or colloidal interference in the groundwater sample.
- TPH-Dx (diesel range) was identified in a groundwater sample from Geoprobe boring GP-603 in the Knoll Area (former fish net storage area) at a concentration of 980 µg/L, above the PCL of 500 µg/L.

  Subsequent investigation of the Knoll Area was completed as part of the 2018-2019 SCE, including the installation of 4 groundwater monitoring wells (MW-12 to MW-14, and MW-18) and groundwater seep sampling. TPH-Dx (diesel range) was not measured above PCLs in the groundwater seep.
- Naphthalene and cPAHs were identified in a groundwater sample from Geoprobe boring GP-601 above the PCLs. No other groundwater samples from the Knoll Area identified IHS above PCLs.

  Subsequent investigation of the Knoll Area was completed as part of the 2018-2019 SCE, including the installation of 4 groundwater monitoring wells (MW-12 to MW-14, and MW-18) and groundwater seep sampling. Naphthalene and cPAHs were not measured above

PCLs from the monitoring wells or groundwater seep (with the exception of cPAHs at MW-13 at 0.02 ug/L, above the PQL-based PCL of 0.015 ug/L). While these isolated areas of TPH-Dx (diesel range), cPAHs, and naphthalene impacts are not drivers for developing a remedial action for groundwater in the Knoll Fill Area, these areas will nonetheless be addressed by the Knoll Fill Area groundwater remedial actions.

4.1.3 UPLAND INDICATOR HAZARDOUS SUBSTANCES

Based on the screening process described above, along with an assessment of known historical operations areas and suspected contaminants associated with those operations, the following IHS were selected for the development of proposed remedial action alternatives presented in the FS (Section 7). Further assessment of the primary assessment areas in relation to the IHS, including a presentation of the extent of IHS impacts, are presented in Section 5.

- TEQ cPAH values for soil and naphthalene for groundwater in the Creosote Area.
- Naphthalene for soil gas in the Creosote Area.
- Total PCB congeners for groundwater in the Knoll Fill Area (significant soil impacts have not been identified in the Knoll Fill Area).
- TEQ Dioxin/Furan values for soil and groundwater in the Woodlife Area.

4.2 MAULSBY MARSH FRESHWATER SEDIMENT CHARACTERIZATION

As described in section 4.1, upland investigations in the Creosote Area revealed contamination in soil and groundwater that extended below West Marine View Drive. The presence of this contamination led to the collection of hand-auger samples in the upland areas within the BNSF rail alignment area that also resulted in detections of site-related contaminants. Further characterization of Maulsby Marsh was included in the Marine and Maulsby Marsh Sediment Characterization QAPP (Anchor QEA 2011). Tiered sampling and analysis of sediments were conducted in accordance with the QAPP in 2012. The full results of the investigation are presented in Appendix E.

4.2.1 SUMMARY OF FRESHWATER SEDIMENT SAMPLING INVESTIGATIONS, METHODS, AND LOCATIONS

A total of 18 freshwater surface sediment samples were collected. Of those, 9 surface sediment samples located closest to the BNSF railroad tracks (MS001 through MS009) were submitted to the laboratory for analysis of PCBs, pesticides, metals, SVOCs, TPH, and sediment conventional analyses including grain size, total solids, total organic carbon, ammonia, and total sulfides. Material collected from the remaining sample locations were submitted to the laboratory as archive samples. A portion of each sample was archived for possible EPH testing. All TPH testing was initially conducted on the first tier of 9 samples collected using Northwest TPH (NWTPH) methods. The four sediment samples with the highest NWTPH concentrations, (MS001, MS002, MS003, and MS006) were tested further for EPH to further characterize the nature of hydrocarbons in these samples.

4.2.2 FRESHWATER SEDIMENT ANALYTICAL RESULTS

Upon receipt of the initial 9 sediment sample results, Ecology consultation was conducted to determine if or where additional tier testing was required. The data results were screened by then draft Freshwater SCO values (now adopted in 2019 SCUM) to determine if Site-related contaminants of concern, particularly TPH and PAHs, were detected above criteria. Some parameter results did exceed criteria (Table 4.2.2) but were not related to the Site COCs. Therefore, no additional analysis was required to delineate the extent of contamination.

4.2.3 INDICATOR HAZARDOUS SUBSTANCES – FRESHWATER SEDIMENT

Not applicable.

4.2.3.1 NATURE AND EXTENT OF INDICATOR HAZARDOUS SUBSTANCES – FRESHWATER SEDIMENT

Not applicable.

4.3 MARINE SEDIMENT CHARACTERIZATION

This section details results for the Marine Sediment Site Characterization.

4.3.1 MARINE SURFACE SEDIMENT CHARACTERIZATION

This section summarizes the characterization of surface sediment concentrations in marine areas of the Site.

4.3.1.1 SUMMARY OF SURFACE SEDIMENT SAMPLING INVESTIGATIONS, METHODS, AND LOCATIONS

Four separate work plans were developed that included collection and analysis of surface sediment samples from the Site:

- SAIC 2008 – One Site location analyzed for total PCBs (Aroclor method) and dioxins/furans
- Bay Wood Products 2009 – Two Site locations analyzed for dioxins/furans
- SLR 2009 – JELD-WEN Phase 1 RI/FS Work Plan
- Anchor QEA 2012/2014 – JELD-WEN Phase 2 RI/FS Work Plan

Each of these sampling and analysis efforts is summarized in the sections below. The combined surface sediment sampling locations are presented on Figure 4.3-1 and Figure 4.3-2; laboratory analyses conducted on each sample are summarized in Table 4.3-1. All surface sediment results are compiled in Appendix H, Table H-1 and compared to SMS sediment cleanup objective (SCO) chemical criteria for marine sediments. Field collection forms are presented in Appendix I. The data quality summary is included in Appendix J.

SAIC 2008

A single surface sediment sample (0 to 10 centimeters [cm]; Station A2-18B; see Figure 4.3-1) was collected in August 2008 within the Site area as part of the larger Port Gardner sediment quality investigation conducted by Ecology (SAIC, 2009). The surface sediment sample was collected using a modified van Veen grab sampler. The sample was analyzed for dioxins/furans and total PCBs (Aroclor method; Table 4.3-1).

Bay Wood Products 2009

Two surface sediment samples (Stations BW-03-SS and BW-11-SS; see Figure 4.3-1) were collected by the Port of Everett in June 2009 from the adjacent northern tidal mudflat area as part of the RI/FS for the adjacent Bay Wood Products Site (Bay Wood; Cleanup Site ID: 2581). The Bay Wood surface sediment samples were collected from a depth of 0 to 10 cm at low tide by hand. The two locations were collected by measuring a 1-square-meter grid at the station location and then collecting equal volumes of 0 to 10 cm sediment from each corner of the square using a stainless-steel trowel. Surface sediment samples were analyzed for dioxins/furans (Table 4.3-1).

SLR 2009

As part of the initial Site RI/FS sampling, 34 surface sediment (0 to 10 cm) samples were collected by JELD-WEN in June 2009 and analyzed following the Ecology-approved Work Plan (SLR, 2009). All sediment samples were collected from fine-grain materials using hand tools at low tide. Sediment samples were collected adjacent to each of the nine identified historical and/or current stormwater outfalls (Stations 3SED1 through 3SED8, and 3SED10; Figure 4.3-1). Surface sediment samples were also collected from the eastern-most segment of the channel along the north boundary of the Site (Station 3SED9) and in the vicinity of the former fish net storage building and Knoll Area at the southeastern corner of the Site (Stations 3SED11 and 3SED12). At each sampling location, three separate grab samples (denoted with an A, B, or C identifier) were collected either along the stormwater flow alignment (for outfall area samples) or in a radial pattern (for all other samples), with each sample approximately 10 feet equidistant from the other(s).

Anchor QEA 2012/2014

The 2008 and 2009 sampling data summarized above identified dioxins/furans and total PCBs as COPCs in the marine sediments at the Site. However, additional data were needed to characterize the horizontal and vertical extent of these COPCs at the Site. In addition, since elevated concentrations of PAHs were detected in upland soils and groundwater at the Site (Section 4.1), further sampling and analysis was needed to determine if PAHs may also be a COPC in Site sediments. The Ecology-approved Phase 2 RI/FS Work Plan was developed to address these data gaps (SLR, 2011), and included the following:

- In May 2012, surface sediment (0-10 cm) samples were collected from 10 Exposure Areas (EAs) located immediately adjacent to the Site shoreline (see Figure 4.3-1).
- Two Site EAs were targeted for more detailed composite sampling and analysis of surface sediment and tissue (see Section 4.4). The first composite area (JW-EA-01; see Figure 4.3-1) targeted tidal mudflats at the head of the relatively narrow channel immediately adjacent to stormwater outfalls draining uplands at the northeastern corner of the Site.

> The second composite area (JW-EA-10) targeted tidal mudflats immediately adjacent to the former fish net storage building and Knoll Area at the southeastern corner of the Site. For comparison purposes, sediment and tissue samples were also collected from upstream, downstream, and regional reference areas with similar grain size and other habitat characteristics (see Figure 4.3-2).

All surface sediment samples were obtained at low tide by collecting and homogenizing five equal volume aliquots to create each sample. One aliquot was collected at the target location and the other four aliquots were collected approximately 3 feet from the target location at four points in a compass pattern. Sediments were collected with decontaminated stainless-steel spoons or disposal scoops, placed into a stainless-steel bowl, homogenized and placed into sample containers. The discrete surface sediment locations were composited by EA in the upland area of the facility. The discrete collection procedure was replicated in all subsequent surface sediment sampling described in this subsection.

In October 2012, archived sediment samples were submitted for additional discrete sample analyses. The submittal was composed of 29 sediment locations that were all analyzed for dioxin/furans. Six of the 29 locations were also submitted for PCB congener analyses.

In April 2013, Ecology approved a QAPP Addendum (Anchor QEA, 2013a) to submit additional archived surface sediment samples for dioxin/furan and/or PCB analysis, and to collect and analyze surface sediments from another 10 stations. Following review of these data, an additional seven discrete samples were submitted for dioxin/furan and/or PCB analysis. In September 2013, Ecology approved a second QAPP Addendum (Anchor QEA, 2013b) for the collection and analysis of the final two surface sediment samples to complete the RI/FS. In March 2014, Ecology approved a third QAPP Addendum (Anchor QEA, 2014) for the collection and analysis of clam tissue from an additional three locations to further refine the PCB biota sediment accumulation factor (BSAF).

4.3.1.2 SURFACE SEDIMENT ANALYTICAL RESULTS

This section summarizes analytical results for the combined RI/FS surface sediment sampling data set collected between 2008 and 2013, as summarized above. All surface sediment analytical results are presented in Appendix H, Table H-1 which compares the results to preliminary SCO and cleanup screening level (CSL) benthic chemical criteria. For chemical summations, different non-detect summation methods were performed (i.e., assuming non-detect [U] equals 0, ½, and the reporting limit).

Surface samples were analyzed for grain size, conventional parameters, SVOCs, PAHs, dioxins/furans, and PCBs (both as Aroclors and as congeners). Summary tables including the detection frequency, minimum, maximum, mean and non-detect information for each analytical group are presented in Tables 4.3-2 through 4.3-14.

Validation reports for the RI/FS data are provided in Appendix J. The reviews confirmed that the overall quality of the chemistry data was acceptable for use in site characterization for this RI/FS.

4.3.1.2.1 GRAIN SIZE AND CONVENTIONAL PARAMETERS

Grain size was evaluated in 54 sediment samples as part of the SLR 2009 and Anchor QEA 2012/2013 sediment characterization. While most Site surface sediments are composed of sand and silt-sized materials, there are localized areas with coarser materials. Surface sediment gravel content at the Site ranges from 0.1% to 69.9%; sand content ranges from 1.6% to 77%; silt content ranges from 2.5% to 85%; and clay content ranges from 0.9% to 20.9%. A grain size results summary table is presented in Table 4.3-3.

Conventional sediment analyses included total organic carbon (TOC), black carbon, and total volatile solids (TVS), along with other parameters. Conventional parameter results are summarized in Table 4.3-1, and key analytes are highlighted below:

- TOC was measured in 99 samples, and ranged from 0.289% in sample 3SED6-B to 6.65% in sample 3SED3-A.
- Black carbon was detected in all 20 samples analyzed and ranged from 0.12% in sample JW-EA06-COMP-120507 to 0.21% in sample JW-EA01-SS03-120507.
- TVS was measured in 34 samples and ranged from 1.69% in sample 3SED10-A to 10.53% in sample 3SED8-B. All surface sediment samples collected from the Site had TVS concentrations below wood waste cleanup standards developed to date at other Puget Sound sediment cleanup sites. For example, the TVS cleanup level developed for the Former Scott Mill Site in Anacortes was 12.2%, and the TVS screening level used in the RI/FS of the adjacent Bay Wood Site is 15.0%; maximum concentrations at the Site are below these regional benchmarks. In addition, detailed examinations of sediment cores (e.g. see Section 4.3.2) revealed that surface and near-surface sediments throughout the Site area contain less than 20% wood by volume (typically in the form of bark fragments), which again is below wood waste cleanup standards developed to date for other Puget Sound sediment cleanup sites.

4.3.1.2.2 METALS

Metals were analyzed in 34 samples collected from the Site. Cadmium was not detected in any of the samples. The detection frequency for all other metals ranged from 76% to 100%. A summary of metals results is presented in Table 4.3-4. None of the results exceed the SCO chemical criteria for metals, and thus metals were not identified as COPCs in Site sediments.

4.3.1.2.3 SEMIVOLATILES

SVOCs were analyzed in 34 surface sediment samples collected from the Site. Summaries of SVOC dry weight (dw) values and organic carbon (OC) normalized results are provided in Table 4.3-5 and Table 4.3-6, respectively. Three surface sediment samples had detectable concentrations of three different SVOCs that exceeded SCO chemical criteria (see Appendix H, Table H-1).

- Benzoic acid exceeded the SCO and CSL chemical criteria in sample 3SED9-A.
- Dibenzofuran exceeded the SCO chemical criterion in sample 3SED10-A.
- Hexachlorobenzene exceeded the SCO and CSL chemical criteria in sample 3SED6-C.

Because of the isolated detections of these SVOCs at the Site, and also because these chemicals have not been identified as COPCs in the Site uplands (see Section 4.1), SVOCs were not identified as COPCs in Site sediments. Moreover, samples 3SED9-A and 3SED10-A also exceed SCO chemical criteria for Site COPCs (dioxins/furans and/or total PCBs) and are included within the footprint of prospective remedial actions at the Site (see Section 11).

4.3.1.2.4 POLYCYCLIC AROMATIC HYDROCARBONS

Thirty-nine (39) surface sediment samples collected from the Site were analyzed for PAHs. Both dw and OC-normalized values are presented in Table 4.3-7 and Table 4.3-8, respectively. PAHs were detected in all but two samples. Four individual PAH results exceeded SCO chemical criteria, but only in a single sample collected adjacent to a stormwater outfall (see Appendix H, Table H-1):

- Acenaphthene, fluoranthene, fluorene, and phenanthrene exceeded SCO chemical criteria in sample 3SED10-A.

The concentrations of PAHs detected in sample 3SED10-A, and also in sediment and tissue samples collected from other areas of the Site, are within the upstream, downstream, and regional reference area ranges (see Figure 4.3-2). Thus, PAHs were not identified as COPCs in Site sediments for benthic protection. Similar to the dibenzofuran detection summarized above, sample 3SED10-A also exceeded SCO chemical criteria for Site COPCs (dioxins/furans and/or total PCBs) and is included within the footprint of prospective remedial actions at the Site (see Section 11).

Sediment cPAH TEQ, calculated in accordance with toxicity factors in WAC 173-340-708(e), was retained as a COPC for the evaluation of human health protection for completeness. However, samples with cPAH TEQ exceeding the preliminary SCO criterion of 21 µg/kg dw (based on natural background), were encompassed within the footprint of prospective remedial actions at the Site as defined by total PCBs and dioxin/furan TEQ (see below). Surface sediment cPAH TEQ dw concentrations (U = 1/2) in the Site area are summarized in Figure 4.3-3.

4.3.1.2.5 POLYCHLORINATED BIPHENYLS

Thirty-five (35) surface sediment samples collected from the Site were analyzed for PCBs using the Aroclor method, and an additional 37 surface sediment samples were analyzed for PCBs using the congener method. Both dw and OC-normalized values for total PCBs are presented in Table 4.3-9 and Table 4.3-10.

Of the 72 surface sediment samples collected from the Site area that were analyzed for PCBs (using either the Aroclor or congener method), 18 samples (25%) had detectable concentrations of total PCBs that exceeded the preliminary SCO chemical criterion (based on human health protection) of 35 µg/kg (dw basis; see Section 6.1.1.3). Surface sediment total PCB dw concentrations (U=0) in the Site area are summarized in Figure 4.3-4, using inverse distance weighting (IDW) contouring of the RI/FS data set. The highest dw concentration of total PCBs on an EA basis (approximately 141 µg/kg at station JW-EA-10) was detected immediately adjacent to the Knoll Area. Since total PCB concentrations in this area of the Site also exceeded the upstream, downstream, and regional reference area range, total PCBs were retained as a COPC in Site sediments.

4.3.1.2.6 DIOXINS/FURANS

Seventy-seven (77) surface sediment samples collected from the Site were analyzed for dioxins/furans. All samples had one or more dioxin/furan detection. Both dw and OC-normalized dioxins/furans congener results are presented in Table 4.3-13 and Table 4.3-14, respectively. Total dioxin/furan TEQ levels in each sample were calculated using World Health Organization (2005) toxic equivalency factors for mammals.

Of the 77 surface sediment samples collected from the Site area that were analyzed for dioxins/furans, 48 samples (62%) had TEQ levels that exceeded the preliminary SCO chemical criterion (based on the practical quantitation limit [PQL]) of 5 ng/kg; dw basis; see Section 6.1.1.3). Surface sediment dioxin/furan TEQ dw levels (U=1/2) in the Site area are summarized in Figure 4.3-5, using IDW contouring of the RI/FS data set. The highest dw dioxin/furan TEQ level on an EA basis (approximately 91 ng/kg at station JW-EA-06) was detected immediately adjacent to historical and/or current stormwater outfalls draining uplands at the western end of the Site. Since dioxin/furan TEQ levels in this area of the Site exceed the upstream, downstream, and regional reference area range, dioxin/furan TEQ was retained as a COPC in Site sediments.

4.3.1.2.7 COPLANAR (DIOXIN-LIKE) PCB CONGENERS

A subset of PCB congeners denoted coplanar PCBs (i.e., those congeners not substituted at the ortho ring positions) exhibit dioxin-like properties and, like dioxins/furans, TEQ levels for these congeners can also be calculated using World Health Organization (2005) toxic equivalency factors for mammals. Seventy-two (72) surface sediment samples collected from the Site were analyzed for coplanar PCB congeners, and all samples had one or more coplanar PCB detection. Both dw and OC-normalized coplanar PCB congener results are presented in Table 4.3-11 and Table 4.3-12, respectively.

Surface sediment coplanar PCB congener TEQ concentrations (U=1/2) in the Site area are summarized in Figure 4.3-6. The highest dw coplanar PCB TEQ level on an EA basis (approximately 1.8 ng/kg at station JW-EA-09-SS38) was detected offshore of the Knoll Area. While this maximum TEQ level is below the preliminary SCO chemical criterion for dioxin/furan TEQ (based on the PQL) of 5 ng/kg, the cumulative risks of dioxins/furans plus coplanar PCB congener TEQ levels are nevertheless additive. Coplanar PCB congener TEQ levels offshore of the Knoll Area exceeded the upstream, downstream, and regional reference area range. However, since the spatial pattern of elevated coplanar PCB congener TEQ levels at the Site is similar to that of total PCBs, retaining coplanar PCB congeners as a Site COPC would not change the footprint of prospective remedial actions at the Site (see Section 11).

4.3.2 MARINE SUBSURFACE SEDIMENT CHARACTERIZATION

This section summarizes the characterization of subsurface sediments at the Site. Sampling and processing were carried out in accordance with the Sampling and Analysis Plan (SAP, Anchor QEA, 2011).

4.3.2.1 SUMMARY OF SUBSURFACE SEDIMENT SAMPLING INVESTIGATIONS, METHODS, AND LOCATIONS

As specified in Section 2.1 of the SAP (Attachment 1 of the Ecology-approved QAPP), sediment coring sample locations were determined based on a review of the marine surface sediment sample results summarized in Section 4.2. Twelve sediment cores were collected at locations shown in Figure 4.3-7 to characterize the vertical extent of sediment COPCs at the Site.

Nine cores were collected in April 2013 and two additional cores were collected in September 2013 for physical testing, and dioxin/furan and PCB congener analysis. Cores were collected utilizing an electrically powered vibracoring device. Prior to deployment, a decontaminated 4-inch-diameter aluminum core barrel was attached to the coring device and the corer was lowered through the water column under winch control. The unit was then energized and lowered by means of its weight and vibration applied until the desired penetration depth was achieved or refusal was encountered. The core penetration was continuously monitored while the vibracore was advanced into the sediments. Core penetration was monitored using a transducer attached to the top of the core tube, which measured the distance the vibracore was advanced into the sediment.

During the April 2013 core sample acquisition, the field team (with Ecology oversight) observed potential visual indication of contamination (i.e. staining) and hydrocarbon-like odors at the 7- to 7.3-foot depth interval at core location JW-SC05 (no similar observation in the overlying sediments). In consultation with Ecology, the interval was submitted for SVOC testing (including PAHs) to characterize the subsurface sediment interval. Following the initial testing, an additional overlying subsurface interval from 6 to 7 feet at location JW-EA-SC-05 and single interval at EA04-SC13 were submitted for SVOC testing (including PAHs).

Station JW-EA07-SC27 was inaccessible by boat due to its high tidal elevation, and the sediment core at this location was collected using a hand operated push core. The hand coring device utilized a decontaminated 3-inch-diameter polycarbonate core tube. Sediment sampling was conducted by pushing the coring device vertically into the sediment using a sliding hammer device, and manually pulling the core back out. Two additional cores were collected in September 2013 at locations JW-GC1b and JW-GC2 using the hand coring device described above to collect sediment samples for geochronology analyses.

All cores collected in April 2013 for chemistry analyses were processed at an on-site upland location the day following core collection. Two additional cores, JW-401 and JW-402, collected in September 2013 for chemistry analysis, were transported and processed at Analytical Resources Inc. (ARI) analytical laboratory the day following core collection. All cores were stored upright on ice and processed following procedures described in the SAP. Each core section was logged throughout the full penetration depth and the sediment description was recorded. Copies of the field collection forms and core processing logs describing sediment lithology are included in Appendix H. Appendix H, Table H-1 summarizes the coordinates and mudline elevations of the sampling locations. Core sampling locations are presented in Figure 4.3-7. Cores for sediment characterization were sectioned at 2-foot intervals to a depth of 6 feet below mudline, then at 1-foot intervals to the bottom of the core. The core collected by hand at JW-EA07-SC27 was processed in 1-foot sections to the bottom of the core. Each core interval was submitted for conventional, dioxin/furan, and/or PCB congener analysis, as summarized in Table 4.3-1. Sample intervals below those specified for analysis were submitted to the laboratories for archive storage for future analysis, as necessary.

Additionally, duplicate hand-collected cores were taken from locations JW-GC1 and JW-GC2 (Figure 4.3-7) for wet sieving and geochronology analysis, consistent with the Second QAPP Addendum (Anchor QEA, 2013b). Wet sieve and geochronology samples were collected at 2 cm intervals to a depth of approximately 1 foot below mudline. Wet sieving (using a #200 sieve) was used to obtain a visual estimate of the percent of wood fragments present in the cores. As summarized in Appendix H, Table H-3, wood debris averaged approximately 7% by volume in both cores, ranging from 0% to 20%. The radiochemical analyses are summarized in Table 4.3-22 and are discussed in Section 4.3.3.5.

4.3.2.2 SUBSURFACE SEDIMENT ANALYTICAL RESULTS

Appendix H, Table H-2 presents tabular summaries of the subsurface sediment data. Subsurface samples were analyzed for grain size, TOC, PAHs, SVOCs, dioxins/furans, PCBs, and selected radionuclides (for geochronology analyses). Where chemical summations are required, all non-detect summation methods have been included (e.g., U=0, ½, and the reporting limit).

4.3.2.2.1 GRAIN SIZE AND TOTAL ORGANIC CARBON

Grain size was analyzed in 20 samples and results ranged from fine clay to gravel, with the highest percentages in the sand range. Gravel content ranged from 0.2% to 3.7%; sand content ranged from 13.8% to 93.1%; silt content ranged from 4.4% to 65.1%; and clay content ranged from 1.2% to 23.6%. Grain size results are presented in Table 4.3-15. Thirty-nine (39) intervals were analyzed for TOC and results ranged from 0.305% in the 6- to 8-foot interval of core SC402 to 8.78% in the 7- to 7.3-foot interval from core EA02-SC05. A summary of TOC results is presented in Table 4.3-16.

4.3.2.2.2 SEMIVOLATILE ORGANIC COMPOUNDS

Consistent with the Ecology-approved QAPP, SVOCs were analyzed in the 6- to 7-foot (interval D) and 7- to 7.3-foot (interval E) intervals of core EA02-SC05 and in the 6- to 7-foot interval (interval D) of core EA04-SC13. A summary of SVOC results for these samples is presented in Table 4.3-17 and below:

- 4-methylphenol exceeded SCO chemical criteria in interval E of EA-SC-05 and interval D of EA04-SC13.
- Benzoic acid exceeded the SCO chemical criteria in interval D of EA-SC-05.
- Dimethyl phthalate exceeded the SCO chemical criteria in interval E of EA-SC-05.

As discussed in Section 4.2.2.3, with the exception of benzoic acid, which had elevated concentrations at a single surface sediment sample at the Site, these chemicals were generally not detected above SCO chemical criteria in surface sediments, and also have not been identified as COPCs in the Site uplands (see Section 4.1). Thus, SVOCs were not identified as COPCs in Site sediments.

4.3.2.2.3 POLYCYCLIC AROMATIC HYDROCARBONS

PAHs were analyzed in the 6- to 7-foot (interval D) and 7- to 7.3-foot (interval E) intervals collected from core EA02-SC05 and the 6- to 7-foot interval (interval D) of core EA04-SC13. A summary of PAH results is presented in Table 4.3-18. None of the subsurface samples exceeded SCO chemical criteria for PAHs. As discussed in Section 4.2.2.4, PAHs were not identified as COPCs in Site sediments.

4.3.2.2.4 POLYCHLORINATED BIPHENYLS

PCB Aroclors were analyzed in a single core interval collected at station EA02-SC05, and PCB congeners were analyzed in an additional 10 core intervals collected from stations EA09-SC36, EA09-SC38, and EA10-SC42. A summary of PCB results is presented in Table 4.3-19 and Table 4.3-20.

Relative to surface (0 to 10 cm) concentrations, all of the underlying 0- to 2-foot core sample interval samples had lower concentrations of total PCBs (Figure 4.3-8). While the 0- to 2-foot core interval samples collected near the Knoll Area had total PCB concentrations that exceeded the preliminary SCO chemical criterion (based on human health protection) of 32 µg/kg (dw basis; see Section 6.1.1.3), all of the deeper (i.e., 2- to 4-foot) core intervals had total PCB concentrations that were well below 32 µg/kg. Based on these data, only relatively shallow sediments at the Site exceed the preliminary SCO chemical criterion for total PCBs.

4.3.2.2.5 DIOXINS/FURANS

Thirty-six (36) subsurface core intervals were analyzed for dioxins/furans. Total dioxin/furan TEQ dw levels in subsurface sediments ranged from below detection (less than 0.16 ng/kg) to approximately 105 ng/kg. A summary of dioxins/furans results is presented in Table 4.3-21.

Unlike total PCBs as discussed above, relatively deeper subsurface sediments in some areas of the Site exceeded the preliminary SCO chemical criterion for dioxin/furan TEQ (based on the PQL) of 5 ng/kg, particularly at locations closest to stormwater outfalls. For example, at station EA-02, located towards the head of the northern channel Site boundary, dioxin/furan TEQ values greater than 5 ng/kg extended more than 7 feet below mudline (below the bottom interval of the core collected at this location; Figure 4.3-8). In other Site areas with elevated surface sediment dioxin/furan TEQ levels (e.g., station JW-EA-06, located adjacent to historical and/or current stormwater outfalls draining uplands at the western end of the Site), subsurface sediments exceeding 5 ng/kg were typically limited to the top 4 feet of sediments.

4.3.2.2.6 GEOCHRONOLOGY

In sediment environments, chronological scales can often be determined by analyzing the vertical distribution of relatively short-lived radioactive isotopes in surface and near-surface core intervals. Consistent with geochronology investigations successfully performed at other areas in Puget Sound (e.g., Lefkovitz et al., 1997), geochronology sampling and analysis in the Site area focused on two radioisotopes: Cesium-137 (Cs-137), released to the atmosphere from nuclear tests in the 1950s/1960s with a half-life of approximately 30 years; and Lead-210 (Pb-210) a naturally occurring radioisotope present in sediments both from atmospheric deposition and background activity with a half-life of approximately 22 years. Cs-137 was analyzed on 30 samples, and Pb-210 was analyzed on 29 samples. All samples were obtained from high-resolution core sections collected from stations JW-GC1 and JW-GC2 (Figure 4.3-9), both located offshore of the Knoll Area. A summary of radiochemical data is presented in Table 4.3-22.

In core JW-GC-1, Cs-137 was detected in the first interval collected below mudline (0.14 pCi/g at 2 to 4 cm) but had non-detectable Cs-137 activities (typically less than 0.01 pCi/g) below this interval. In core JW-GC-2, Cs-137 was detected in all five near-surface intervals with a peak activity (0.26 pCi/g) at 10-12 cm, and detectable Cs-137 (0.13 pCi/g) extended to 18-20 cm (Figure 4.3-9). Cs-137 was released to the atmosphere from nuclear tests as early as 1954 and reached a peak in approximately 1963 (e.g., see Lefkovitz et al., 1997). Thus, the Cs-137 core data suggest an average contemporary net sedimentation rate (corrected for the average 7% wood debris measured in these two cores; see Section 4.3.2) at the Site of approximately 0.17 ± 0.08 cm/year (i.e., an average 0.6-inch accumulation over a 10-year period), with different rates measured at each core:

- JW-GC-1: 0.06 to 0.11 cm/year
- JW-GC-2: 0.20 to 0.30 cm/year

The structured vertical profile of Cs-137 activity, particularly in core JW-GC-2, is also indicative of stable sediments (i.e., little vertical sediment mixing) over the past 60 to 70 years (Figure 4.3-9). Further, the data from both cores suggest that bioturbation of surface sediments is less than 10 cm, and more likely less than 4 cm. Thus, the SMS marine sediment default 10 cm bioactive zone is a conservative overestimate of bioturbation at the Site.

Pb-210 was detected in all 29 geochronology samples. However, all Pb-210 activities measured in the two geochronology cores were not statistically different (P>0.10) from the deeper sediment background range, and thus could not be used to reliably estimate sedimentation rates. This is likely due to the low Pb-210 activities in glacial and agricultural sediments moving through the Site area from the upper Snohomish River watershed, which limit the utility of the Pb-210 dating method at this Site.

4.3.3 CLAM TISSUE SAMPLING

4.3.3.1 SUMMARY OF SUBSURFACE SEDIMENT SAMPLING INVESTIGATIONS, METHODS, AND LOCATIONS

As discussed in Section 4.2.1, two Site EAs were targeted for detailed composite sampling and analysis to characterize site-specific bioaccumulation of COPCs. The first composite area (JW-EA-01; see Figure 4.3-1) targeted tidal mudflats at the head of the relatively narrow channel immediately adjacent to historical and/or current stormwater outfalls draining uplands at the northeastern corner of the Site. The second composite area (JW-EA-10) targeted tidal mudflats immediately adjacent to the former fish net storage building and Knoll Area at the southeastern corner of the Site. For comparison purposes, sediment and tissue samples were also collected from upstream, downstream, and regional reference areas with similar grain size and other habitat characteristics (see Figure 4.3-1). Consistent with the Ecology-approved Phase 2 RI/FS Work Plan (Anchor QEA, 2013b), composite clam tissue samples of a single relatively abundant species, *Mya arenaria* (soft shell clam), were collected in May 2013 and analyzed for dioxins/furans, PCB congeners, PAHs, and lipids.

4.3.3.2 CLAM TISSUE ANALYTICAL RESULTS

The clam tissue analyses are presented in Appendix H-6, Table H-4. Percent lipids varied little between each of the five composite tissue samples, ranging from approximately 0.32% to 0.6%. Similarly, total cPAH TEQ levels in the two Site composite samples (JW-EA-01 and -10) ranged from approximately 1.3 to 1.8 µg/kg wet weight (U=1/2), and were within the regional and upstream/downstream reference range of approximately 0.58 to 5.6 µg/kg wet weight. Consistent with the sediment data discussed in Section 4.2.2.4, the tissue data further confirmed that cPAHs are not COPCs in Site sediments.

Dioxins/furans were detected in all five composite clam tissue samples. Dioxin/furan TEQ levels in the two Site composite tissue samples (JW-EA-01 and -10) ranged from approximately 0.13 to 0.23 ng/kg wet weight (U=1/2), and this range is similar to or up to roughly two times higher than the regional sample level of approximately 0.11 ng/kg (Table 4.3-23).

PCB congeners, including coplanar PCBs, were detected in all eight composite clam tissue samples. Tissue total PCB concentrations from the five site-specific locations (JW-EA-01, JW-EA-10, P-100, P-50, and P-25) ranged from approximately 2.9 to 4.2 µg/kg wet weight (U=0), roughly three to five times higher than the regional sample concentration of approximately 0.89 µg/kg. Finally, tissue coplanar PCB congener TEQ levels ranged from approximately 0.0022 to 0.076 ng/kg wet weight (U=0), roughly two to four times higher than the regional sample level of approximately 0.0014 ng/kg.

The clam tissue data confirm that PCBs and dioxins/furans bioaccumulate at the Site, although the magnitude of bioaccumulation is relatively modest (i.e., up to a factor of five higher than regional sample levels for PCBs, and up to a factor of two higher for dioxins/furans), particularly compared to the relatively more elevated sediment concentrations of these COPCs (Table 4.3-23). Black carbon materials present in Site sediments likely partially sequestered PCBs and dioxins/furans, reducing their bioavailability. Black carbonaceous particles in sediments such as soot, coal, and charcoal bind very strongly to hydrophobic chemicals such as PCBs and dioxins/furans (partitioning coefficients for black carbon can be up to 100 times higher than for other organic carbon materials), and their presence in sediments (both natural and anthropogenic) has been demonstrated to substantially reduce bio-uptake and exposure (e.g., Luthy et al., 1997).

As discussed in Ecology's SCUM II guidance (Ecology, 2019), the site-specific BSAF expresses the approximate steady-state relationship between the concentration of a bioaccumulating COPC normalized to the organic carbon content of the sediment, and the COPC concentration measured in the total extractable lipids of an organism. There are many simplifying assumptions inherent in BSAF calculations, including assuming that all COPC bioaccumulation is due to sediment exposure, but current SMS guidance recommends using site-specific BSAFs for individual COPCs to calculate SCO chemical criteria for human health protection (see Section 6.1.1.3).

For total PCB congeners, initial statistical analysis were conducted on all site-specific results (JW-EA01, JW-EA10, P-100, P-50, and P-25) using EPA's ProUCL program. The analysis revealed that the result from JW-EA01 is a statistical outlier, likely because this station is not representative of the rest of the marine area, as it is located at the head of the relatively narrow channel immediately adjacent to stormwater outfalls draining uplands at the northeastern corner of the Site. In accordance with SCUM II, linear regression analysis was performed on the total PCB congener dataset (excluding JW-EA01) to calculate the site-specific PCB BSAF.

For dioxin/furan TEQ and coplanar PCB congener TEQ, linear regression was performed using the regional and upstream/downstream reference stations, along with two stations within the Site, to calculate site-specific BSAFs for these COPCs.

The site-specific BSAF (unitless) values for sediment COPCs are summarized below:

- Total PCB BSAF: 0.032 (slope of regression; $R^2 = 0.76$)
- Dioxin/furan TEQ BSAF: 0.060 (slope of regression; $R^2 = 0.38$)
- Coplanar PCB Congener TEQ: 0.011 (slope of regression; $R^2 = 0.87$)

The site-specific BSAF values for all these sediment COPCs, as summarized above, are all significantly less than 1.0, the theoretical equilibrium value assuming little or no site-specific sequestering. As discussed above, the comparatively lower BSAF values measured reflect reduced bioavailability of COPCs at the Site.

4.3.4 MARINE SEDIMENT INDICATOR HAZARDOUS SUBSTANCES

When defining MTCA or SMS cleanup requirements at a site that has been impacted by a number of hazardous substances, those hazardous substances that contribute a small percentage of the overall threat to human health and the environment may be eliminated from consideration (Chapter 173-340-703 WAC). The remaining hazardous substances shall serve as IHS for purposes of defining site cleanup requirements.

4.3.4.1 IDENTIFICATION OF INDICATOR HAZARDOUS SUBSTANCES – MARINE SEDIMENT

As discussed in Sections 4.2 through 4.4, COPCs identified in marine sediments at the Site include total PCBs, dioxin/furan TEQ, coplanar PCB congener TEQ, and cPAH TEQ. Measurements of percent wood by volume and TVS throughout the Site are all below wood waste cleanup standards developed to date for other Puget Sound sediment cleanup sites. While wood waste, wood waste degradation products, and all other SMS chemicals are not COPCs at the Site, most of the relatively isolated elevated concentrations of these parameters nevertheless occur within the footprint of prospective remedial actions at the Site (see Section 11). As part of remedial design or post-remediation monitoring, TVS may be further characterized to determine compliance with the SMS regulations within the Site boundary.

Elevated coplanar PCB congener TEQ levels at the Site are encompassed within the footprint of prospective remedial actions based on total PCBs and dioxin/furan TEQ. Moreover, the current surface weighted average concentration (SWAC) of coplanar PCB congener TEQ is 0.61 ng/kg dw, which is below the preliminary site-specific SCO of 1.5 ng/kg dw (Figure 4.3-6). Therefore, coplanar PCB congener TEQ is not an IHS.

Site-specific tissue results for cPAH TEQ were not elevated in comparison to regional and upriver/downriver reference locations. In addition, locations where cPAH TEQ levels were elevated above the preliminary SCO of 21 µg/kg dw SCO (based on natural background) are also encompassed within the footprint of prospective remedial actions based on total PCBs and dioxin/furan TEQ. The arithmetic average cPAH TEQ level based on samples collected immediately outside the preliminary Site boundary is 9.9 µg/kg dw (Figure 4.3-2). Therefore, coplanar cPAH TEQ is also not an indicator hazardous substance. As part of remedial design or post-remediation monitoring, cPAH TEQ may be further characterized to determine compliance with the SMS regulations within the Site boundary.

4.3.4.2 NATURE AND EXTENT OF INDICATOR HAZARDOUS SUBSTANCES - MARINE SEDIMENT

Total PCBs

An IDW data model was used to interpolate surface sediment concentrations throughout the marine Site area (Figure 4.3-4). As discussed in Section 4.3.3.3, only relatively shallow sediments (0 to 2 feet below mudline) at the Site exceed the preliminary SCO chemical criterion of 30 µg/kg dw for total PCBs.

Dioxin/Furan TEQ

An IDW data model was also used to interpolate surface sediment dioxin/furan TEQ concentrations throughout the marine Site area (Figure 4.3-5). As discussed in Section 4.3.3.4, compared with total PCBs, relatively deeper subsurface sediments (approximately 4 to greater than 7 feet below mudline) in some areas of the Site exceeded the preliminary SCO chemical criterion for dioxin/furan TEQ of 5 ng/kg dw.

Summed Dioxin Furan and PCB TEQ

Where both coplanar PCB and dioxin/furan congeners have been analyzed (only roughly one-third of the RI/FS data set), the sum of their respective TEQs has been calculated as shown on Figure 4.3-10. As discussed in Section 4.6.3, since incorporation of coplanar PCB congener TEQ data did not change the footprint of prospective remedial actions at the Site, coplanar PCBs were not retained as indicator hazardous substances for marine areas of the Site.

5. CONCEPTUAL SITE MODELS

Conceptual site models (CSM) incorporate physical and chemical information to understand potential fate and transport mechanisms at the Site. The CSMs consider contaminant sources, release mechanisms, transport and exposure pathways, potential receptors, and sediment stability. The CSMs developed for the Site describe the potential release mechanisms from the potential primary sources of hazardous substances to potential secondary and tertiary sources, the exposure media and routes, and the potential human and ecological receptors. This model reflects current conditions and possible future development in assessing exposure pathways. The CSMs are based on available historical land use information, future land use as industrial, and site-specific information gathered during sampling activities. A summary of the CSMs including potential primary sources, release/transport mechanisms, primary exposure media and routes of exposure, potential receptors, and sediment stability are presented below.

5.1 GENERAL SITE OPERATIONS

General Site Operations

Past activities at the Site including door manufacturing, casket manufacturing, pole treating, and mill operations have resulted in likely releases of hydraulic fluids, creosote, fuel oil, toluene, other petroleum hydrocarbon constituents, and dioxins/furans (from former hog fuel burner emissions and associated ash from the historical mill). Potential primary release mechanisms from past activities include leaks or spills to soil, surface pavement, or stormwater at the Site, and releases from USTs to subsurface soil and/or groundwater. Isolated areas of soil and groundwater impacts are described in Section 4.1.2.1 and were confirmed to be limited in extent or below screening levels through follow-up investigations. These areas are not expected to be significant sources of any ongoing release.

5.2 CREOSOTE AREA

Commented [AM(10]: It appears in addition to creosote AST, there were fuel oil AST (TPH?) at this are. Significant contamination of TPH is found in this area. It may be better to rename this area as “creosote/fuel oil” area?

A conceptual site model including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Creosote Area is provided below.

5.2.1 HISTORICAL USE

Characterization data and reported history of use indicate that the primary source of COPCs in soil and groundwater in the Creosote Area is the former pole treating operation on the Site. Prior to the early 1940s, National Pole Company operated a pole treating plant in the eastern portion of the Site and adjacent to the current placement of West Marine View Drive. Based on a review of aerial photographs and historical photos of the area it is likely that the roadway at that time was elevated on pilings (Appendix A).

Based on review of aerial photographs and historical maps, features associated with pole treating activities included two circular creosote ASTs of unknown capacity, three long rectangular ASTs possibly containing creosote, a rack for drying and storing treated poles, an oil house, and a rectangular building used as a combination lunchroom, engine room and machine shop (Figure 2.2-1), 1947 Aerial Photo with Site Features). The Creosote ASTs, drying racks, and oil house were removed between 1943 and 1948. Pole treating operations are not observed in aerial photographs or site maps after 1948. Mudflats east adjacent to the pole treating operations and underneath the suspected elevated roadway appear to have been filled between 1938 and 1947 (Appendix A).

The Nord Door facility operated an oil-fired boiler on the eastern portion of the Site prior to 1957. Former fuel oil ASTs were located in the eastern portion of the Site along West Marine View Drive and also further to the west, beneath what is now the southern portion of the main manufacturing building. These ASTs were removed in the mid-to late-1950s.

5.2.2 PHYSICAL SETTING

The current location of West Marine View Drive historically consisted of tidally-influence mudflats that were likely filled between 1938 and 1947. Based on a review of boring logs from the Creosote Area, fill material appears to consist primarily of dredged sandy sediment with aggerate material below roadway pavement. Construction of West Marine View Drive in its current location (filled land versus elevated roadway on pilings) was completed by 1947 based on the available aerial photographs and Site maps. West Marine View Drive was modified as a wider paved roadway in the 1960’s.

Shallow groundwater has been measured as shallow as approximately 2 feet bgs and is likely influenced by surface water infiltration, site features, stormwater conveyance lines, and utilities infrastructure. Boring logs do not identify a continuous aquitard or aquiclude for the Site (Appendix F). Shallow groundwater samples at the Creosote Area have shown elevated conductivity, TDS, and salinity measurements indicating brackish groundwater conditions. The tidal influence assessment conducted in 2019 within the Creosote Area indicated changes in groundwater elevation associated with tidal swings were minimal.

Calculated shallow groundwater gradients reported during quarterly groundwater sampling activities, and data generated in the 2007 and 2019 transducer studies (Appendix G) indicate groundwater in the Creosote Area flows primarily west from the historical operations area towards Puget Sound with a gradient that averages 0.002 feet per foot (Appendix L). Groundwater below 15 feet bgs is considered “deep” groundwater for this RI/FS report. Calculated deep groundwater gradients reported during quarterly groundwater sampling activities indicate a similar westerly flow direction (Appendix G), and no vertical gradient has been measured in the paired wells (MW-8A-8B, MW-9A/9B, and MW-10A/10B).

Surface water in Maulsby Marsh flows west toward Puget Sound and drains through a culvert located on the southern edge of the marsh. Based on minimal tidal influence observed in monitoring wells in the Creosote Area, surface water elevations in Maulsby Marsh are not expected to be tidally influenced.

5.2.3 SUSPECTED AND CONFIRMED RELEASES

Based on historical documentation and analytical testing National Pole treated timber poles with a creosote wood preservative. Creosote is derived from coal tar and consists of a mixture of aromatic hydrocarbons, anthracene, naphthalene, and phenanthrene derivatives. Likely historical releases of COPCs to soil and groundwater associated with pole treating operations include spills and incidental releases of creosote to the ground associated with transporting and drying treated poles.

Releases of petroleum hydrocarbons in the Creosote Area are likely associated with the historical fuel storage tanks that were located south of the identified pole treating activities (Appendix A). The highest concentrations of COPCs in soil and groundwater were reported during pre-RI investigations in the central portion of the Creosote Area including borings GP-9, -10, -11, -12, -214, -215, and several borings under the existing West Marine View Drive (see Figure 5.2-1). Grading and filling activities associated with construction of West Marine View Drive likely resulted in burial of surficial contamination east of the primary operations area. Additional assessments focused on the Creosote Area were performed under Ecology-approved work plans.

Hand auger soil samples were collected from twelve locations in Maulsby Marsh in 2009 to assess potential impacts east-adjacent to the Site and the BNSF railroad tracks. The assessment analytical results indicate that Creosote Area releases have not affected the marsh sediments or surface water. One soil sample (HA-329) from one-foot bgs measured elevated concentrations of TPH-Dx (diesel range) and PAHs above initial PCLs. Follow-up assessment of Maulsby Marsh sediment was completed in 2011 and it was determined that Creosote Area-related COPCs were not present in the freshwater marsh sediments and the contaminants detected in the marsh sediments were not attributable to Site releases (see Appendix E).

Maulsby Marsh is adjacent to the BNSF railroad tracks where the application of herbicides/pesticides has been observed on the vegetated area that included sample location HA-329. Soil and groundwater analytical results from location HA-329 appear to be an outlier amongst the BNSF sampling, potentially associated with treated railroad ties, and are not considered representative of overall soil and groundwater conditions in the area between the BNSF railroad tracks and Maulsby Marsh.

5.2.4 CONTAMINANT FATE AND TRANSPORT

Soil

COPCs identified for the Site have relatively high partition coefficients and migrate slowly in soil through natural processes including density-driven flow, capillary draw, advection, and diffusion into the subsurface. RI data indicate that the migration pathway from soil to groundwater is complete at the Site; however, additional transport associated with groundwater flow through contaminated soil is also limited (see below). Droplets of non-aqueous phase liquid (NAPL) was observed in soil samples from Geoprobe boring locations, although not as a continuous unit. The presence of dense non-aqueous phase liquid (DNAPL) at depth indicates vertical migration of historical releases through density-driven flow. Soil cross sections for on-property and off-property portions of the Creosote Area are included as Figure 5.2.4-1 and Figure 5.2.4-2

Soil Vapor

Migration of vapor from contaminated groundwater into soil gas has assessed at the Site. Soil gas sampling from within the footprint of the existing main manufacturing building identified naphthalene and benzene exceedances of sub-slab soil gas vapor PCLs.

Groundwater

Groundwater sampling data has demonstrated that creosote impacts to soil and groundwater are localized around the former operation areas in the Creosote Area and beneath West Marine View Drive. Groundwater migration and/or seepage to surface water does not appear to be a mechanism for transport of creosote and/or fuel oil impacts at the Site. cPAH analytical results for two groundwater seeps on the north side of the Site (terminating in the “finger area”) did not measure any individual cPAH concentrations above laboratory PQLs.

Estimates of the shallow groundwater velocity in the Creosote Area (Appendix L) are on the order of one-half foot per day. At this velocity, hundreds of soil porewater volume exchanges have occurred in the Creosote Area over the estimated 70 years since the suspected release(s). However, creosote impacts to soil and groundwater remain localized in an area measuring approximately 650 by 500 feet. The analytical results indicate that groundwater transport is not a significant mechanism for Creosote Area contaminant migration.

Deep groundwater impacts including concentrations of naphthalene (up to 15,900 ug/L, see Table 5.2-2) were reported for groundwater samples collected from deep monitoring well MW-8B. There does not appear to be a contiguous DNAPL plume in the shallow or deep zone as evidenced by NAPL only being observed as droplets in the soil matrix at select boring locations and the majority of groundwater impacts appear to be as dissolved phase; however, additional assessment is needed to define the horizontal extent of deep groundwater impacts. Sufficient deep zone groundwater plume data exists to complete the RI/FS with this identified data gap.

Surface Water and Stormwater

Creosote and fuel oil impacts at the Site in soil are primarily located at depth beneath buildings or pavement. Locations where creosote concentrations in soil exceeded the PCL in subsurface soil at unpaved areas include a thin strip of landscaping on the eastern portion of the Site and areas along the BNSF railroad ROW east of West Marine View Drive. Sediment and tissue sampling data in the adjacent marine and Maulsby Marsh areas did not identify creosote and/or fuel oil releases to surface water. Therefore, overland transport/surface runoff via stormwater is not considered a significant release mechanism for the creosote or fuel oil impacts at the Site.

Stormwater collection and transport via the on-site stormwater conveyance system has been identified as a likely potential historical contributor to sediment contamination on the north and south off-shore areas. However, the majority of the on-site stormwater conveyance system is located outside of the Creosote Area (see Figure 3 from the SCE Summary Report, SLR, 2019a) and the primary COPCs in sediment are dioxins/furans and PCBs. Because the majority of subsurface contamination in the Creosote Area occurs at depth, and minimal collection of stormwater occurs in the Creosote Area, transport of Creosote Area COPCs via the stormwater system is not considered a significant potential pathway for migration of COPCs at the Site.

5.2.5 CLIMATE CHANGE AND EARTHQUAKES

The potential effects of climate change and sea level rise are discussed in Section 3.4 of this report. Potential treatment technologies for the vadose zone within the timeframe for implementation and operation are discussed in the FS section of this report. For the Creosote Area, it is anticipated that sea level rise will result in a corresponding rise in the groundwater table, reducing the thickness of the vadose zone, potentially limiting the effectiveness of remediation treatment technologies targeting the vadose zone. Two- and three-phase partition modeling of creosote and oils in the vadose zone (water, air, and residual oil) within a soil matrix indicate that rising sea levels will increase the oil holding capacity of the soil matrix while reducing the residual oil mobility.

A large magnitude earthquake could cause liquefaction of the silty, sandy soil identified in the Creosote Area. An earthquake analysis/soil liquefaction analysis was not performed as part of this RI. The Creosote Area is generally flat and significant land displacement is not expected during a liquefaction event; although a loss of bearing-capacity, settlement, and associated damage to on-site structures and roadways would be expected. Paved areas, and areas with overburden soil underlain by saturated sandy soil, could see upwelling of sandy soils into pavement base rock or onto the ground surface. The upwelling is expected to be limited to shallow depths and localized.

5.2.6 NATURE AND EXTENT OF CONTAMINATION

Soil contamination at the Creosote Area includes TPH, PAHs, and VOCs primarily under the historical pole treating operations area with dimensions of approximately 650 feet by 385 feet (Figure 5.2-1). Soil impacts in the Creosote Area are bounded laterally to the north, east, south and west by existing RI sampling data. Soil contamination is primarily located between approximately 5 and 15 feet bgs. Deep soil contamination was observed to a maximum depth of approximately 50 feet.

Deep monitoring well MW-8B was installed to a depth of 50 feet bgs and one year after installation, DNAPL has accumulated in the sump that was constructed at the bottom of the well. Based on previous observations at the Site, DNAPL is present in discontinuous ganglia and small pockets in the deep subsurface. A continuous DNAPL plume or lens has not been identified. Additional data collection during remedial design will bound the vertical extent of naphthalene contamination and the lateral extents of contamination at the Creosote Area.

Shallow groundwater contamination in the Creosote Area includes TPH, PAHs, VOCs, and SVOCs. The distribution of COPCs in groundwater is spatially consistent with the distribution observed for COPCs in soil. Shallow TPH, PAH, SVOC, and VOC contamination is limited to the historical pole treatment area and proximate to the historical fuel ASTs in the central portion of the Creosote Area.

RI groundwater data bounds groundwater contamination in the Creosote Area to the north, south, and west. Groundwater samples collected from hand-auger locations on the east edge of the Site were considered to represent the eastern edge of groundwater impacts because no known releases occurred in the marsh area and groundwater flows predominantly to the west.

Soil vapor is contaminated proximate to the area of shallow groundwater impacts. Neither soil nor groundwater contamination associated with the Creosote Area extend to the marine “finger area” or into freshwater in Maulsby Marsh. No Creosote Area COPCs were found in the adjacent Maulsby Marsh freshwater sediments.

5.2.7 AFFECTED MEDIA AND POTENTIAL EXPOSURE PATHWAYS

Results of the RI indicate that affected media at the Creosote Area include soil, soil vapor, and groundwater and potentially complete exposure pathways related to these media in the Creosote Area are described below.

Soil

The Property is zoned as industrial use and it is likely that industrial activities will continue to occupy the on-property portion of the Creosote Area for the foreseeable future. Potentially complete exposure pathways for soil in the Creosote Area include:

- Direct exposure by construction workers (e.g. dermal, incidental ingestion) associated with future on-site work or development work to a maximum depth of 15 feet or less.
- Terrestrial ecological exposure (e.g. dermal, ingestion, bio accumulative) to shallow soil in the unpaved areas only.

Shallow groundwater conditions are likely to limit potential future construction worker exposure to soil within less than approximately 5 feet from the ground surface. Due to the presence of asphalt caps, roadways, and structures on the Site, the terrestrial ecological exposure pathway is limited to a small landscaped area to the east of the main manufacturing building and the area in the BNSF ROW.

Due to the presence of shallow groundwater, surface structures, and the relatively conductive hydrogeology at the Site, no reasonable scenario exists for human or terrestrial ecological exposure to soil contamination greater than 15 feet bgs; therefore, no exposure pathway for deep soil is considered complete.

Soil Gas

Concentrations of naphthalene and benzene in soil gas samples exceeded applicable screening criteria under the existing main manufacturing building on the Site. Therefore, indoor air exposure pathway for workers on-Site is considered complete. Exposure to soil gas outside of existing buildings is unlikely due to immediate dilution by ambient air and lack of confinement to allow buildup of COPCs in the vapor phase

Groundwater

Groundwater at the Site is not considered potable because:

- It is not currently used as a source of drinking water; and,
- It contains natural background concentrations of constituents that make use of the water as a source of drinking water not practicable (brackish conditions).

Elevated Total Dissolved Solids (TDS) and/or salinity have been measured at monitoring wells MW-2, MW-3, MW-6, MW-8A, MW-9A, and MW-15, with a maximum TDS concentration of 15,490 mg/L (see Appendix G for field measurements from quarterly groundwater sampling events). Per MTCA, a TDS concentration in excess of 10,000 mg/L indicates that the groundwater contains natural background concentrations of organic or inorganic constituents that make use of the water as a drinking water source not practicable (173-340-200 (2)(b)(ii)).

In addition, according to MTCA the department recognizes that there may be sites where there is an extremely low probability that the groundwater will be used for domestic purposes because of the site's proximity to surface water that is not suitable as a domestic water supply (173-340-200 (2)(d)). While deep groundwater appears less saline than shallow groundwater, future use of deep groundwater is highly unlikely due to the potential for saltwater intrusion, difficulty of access, and the proximity to Puget Sound.

Groundwater impacts are currently contained under existing surface caps, buildings, and roadways, further limiting potential exposure. Sampling of adjacent shoreline seeps and Maulsby Marsh sediments indicates that groundwater COPCs are not present in either media. Therefore, no complete exposure pathways were identified for shallow or deep groundwater associated with the Creosote Area.

5.2.8 CREOSOTE AREA PROPOSED CLEANUP LEVELS

Site wide COPCs that exceed selected PCLs within the Creosote Area are co-mingled with Creosote Area COPCs. Based on the potentially complete exposure pathways listed above the following IHS have been selected for the Creosote Area:

- TEQ cPAHs in soil;
- Naphthalene in groundwater; and
- Naphthalene in soil gas.

While TPH-Dx and cPAH groundwater impacts have been identified throughout the Creosote Area (including in the deep zone), these impacts are comparatively less mobile, less widespread, and less volatile, and are therefore not appropriate IHS.

Proposed Creosote Area PCLs are:

- Soil Method B (soil);
- Groundwater Method B Protection of Vapor Intrusion (groundwater); and,
- Method B Sub Slab Soil Gas Screening Levels (soil gas).

Exceedances of selected PCLs for the IHS are presented in Table 5.2-1 to Table 5.2-3.

5.3 WOODLIFE AREA

A CSM including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Woodlife Area is provided below.

5.3.1 HISTORICAL USE

Characterization data and history indicate that the primary source of COPCs in soil and groundwater in the Woodlife Area is attributed to an approximately 10,000-gallon AST containing Woodlife wood treatment solution (which contained PCP) that was formerly located northeast of the main manufacturing building (see Figure 5.3-1). The use of the Woodlife AST was discontinued prior to JELD-WEN's purchase of the Site in 1986, and the AST was removed in 1991.

Woodlife use at the former E.A. Nord ended before JELD-WEN's purchase. Woodlife contained PCP and a mineral spirits solution. Dioxin contamination is found in PCP mixtures. Waste associated with lumber preservation processes is considered a Resource Conservation and Recovery Act (RCRA) hazardous waste based under waste classification code F032. The F032 hazardous waste listing is defined in Title 40 of the Code of Federal Regulations (CFR) Chapter 462 and includes wastewater, process residuals, preservative drippage, and discarded spent formulations from wood preserving processes at facilities that currently use or have previously used chlorophenolic formulations. This definition only applies to wood preservation waste, not waste associated with wood surface protection operations at the Site. The F032 waste code was promulgated on December 6, 1990 at CFR Vol. 55 No. 235, Page 50450.

The wood preservation process is distinct from wood surface protection measures, which involve a superficial application of preservative to the wood surface to protect against mold and sap stain. According to 53 Federal Register 53287, most wood surface protection takes place at sawmills and manufacturing facilities like the former Nord Door site, where cut lumber is dip-or spray-treated to prevent sap stain formation during short-term storage. It notes that the distinction between wood preservation and surface protection is not only the process used, but also the depth to which the preservation penetrates and the duration of the process. The USEPA studied this issue before concluding that wastes from wood surface protection processes should not be considered a "listed" waste under F032. On January 4, 1994, the USEPA issued a final hazardous waste listing determination for wastes generated from the use of chlorophenolic formulations in wood surface protection processes. The 59 FR 458 Federal Register notice states in the summary section that: Upon reviewing the public comments received on its proposal of April 27, 1993, the Agency decided not to list wastes from the use of chlorophenolic formulations in wood surface protection processes as a listed hazardous waste.

Under the USEPA's "contained-in" policy, contaminated soil can become subject to regulations under RCRA if soil "contains" hazardous waste by exhibiting characteristics of hazardous waste or containing certain concentrations of listed hazardous waste. Under RCRA, contaminated soil is subject to the RCRA requirements until the soil no longer contains hazardous waste or, in the case of listed hazardous waste, until the agency determines that the soil no longer contains listed hazardous waste. The identified dioxin impacts identified in the Woodlife Area at the Site are associated with historical sap stain PCP formulations used in the manufacturing process. As dip- or spray-process to prevent sap stain formation during short-term storage is a wood surface protection process, it does not meet the F032 waste classification for wood preserving processes and therefore, dioxin impacted soil at this site is not considered hazardous waste.

5.3.2 PHYSICAL SETTING

The physical setting of the Woodlife Area is similar to the physical setting described in Section 5.2.2 for the Creosote Area.

5.3.3 SUSPECTED AND CONFIRMED RELEASES

Because of the historical use of PCP, soil and groundwater sampling was completed for PCP, dioxins/furans and TPH. PCP was not measured above the laboratory reporting limit in any groundwater sample on the Site and was only detected above the laboratory reporting limit in 3 soil samples from the Woodlife Area (GP-5, GP-29, and GP-501). TPH was detected above the reporting limit in some soil and groundwater samples from the Woodlife Area but were limited in extent and therefore appears to be some crossover with impacts associated with the former National Pole treating operations and fuel oil storage (discussed in Section 5.2, Creosote Area CSM). Dioxin/furan TEQ analytical results indicate that impacts from the Woodlife AST are localized and it is likely that residual dioxins/furans are more persistent than the PCP that was used in the solution and is an apt constituent to trace the horizontal and vertical extent of Woodlife-associated impacts.

5.3.4 CONTAMINANT FATE AND TRANSPORT

Soil

COPCs identified for the Site have relatively high partition coefficients and migrate slowly in soil through natural processes including density-driven flow, capillary draw, advection, and diffusion into the subsurface. RI data indicate that the migration pathway from soil to groundwater is complete at the Site; however, additional transport associated with groundwater flow through contaminated soil is also limited (see below).

Groundwater

Groundwater sampling data has demonstrated that dioxin/furan impacts to soil and groundwater are localized around the former operation areas in the Woodlife Area. Given the substantive groundwater data available for the Site, the distance between the areas of impact and surface water, and the passage of time since these former operations, groundwater migration/seepage to surface water does not appear to be a significant release mechanism for dioxin/furan impacts in the Woodlife Area. Dioxins/furans have a low solubility and tend to bind to soil particles making it comparatively less mobile.

Surface Water and Stormwater

Dioxin/furan impacts in the Woodlife Area are located beneath buildings or pavement; therefore, overland transport/surface runoff is not considered a significant release mechanism for the dioxin/furan impacts in the Woodlife Area. Historical stormwater discharges from the NTD sump, surface flow from off-site properties, including West Marine View Drive, or infiltration of groundwater into the NTD sump and/or drainage from the sump to the subsurface via the apparent sump weep holes were assessed during the source control evaluation and are described below.

5.3.5 NATURE AND EXTENT OF CONTAMINATION

Investigations at the Woodlife Area to further characterize dioxin/furan impacts found that soil and groundwater impacts were generally shallow (less than 5 feet bgs) and appeared to be localized. This assessment work was completed under an Ecology approved Work Plan (SLR, 2013a).

Sentry groundwater monitoring wells MW-6 and MW-7 were installed downgradient of the Woodlife Area and the adjacent surface water and sediment (i.e. the “finger area”). Groundwater data collected during the RI/FS and groundwater seep data collected during the SCE show no migration of dioxins/furans above PCLs to surface water or sediments in the adjacent “finger area”. Assessment of a stormwater sump in the NTD identified weep holes. Following the investigation, the current property owner plugged the weep holes, re-routed the discharge line to an existing stormwater line that discharges to the “finger area”, and removed accumulated solids from within the North Truck Dock sump and from the truck dock ramp area.

Surface water flow during storm events has been observed migrating from portions of West Marine View Drive to the NTD area, and eventually to the sump via the trench drain located in the rear of the dock ramp.

An investigation related to the NTD sump was performed as part of the SCE activities in 2018, as presented in the Summary of North Truck Dock Stormwater Sump Investigation (SLR, 2018d) and the Soil Sampling Summary – Port of Everett Property (SLR, 2018c) reports submitted to Ecology and the Port of Everett. Line tracing was completed on the inlet piping to the NTD sump. A 3” line was found to be connected to the adjacent strip drain at the bottom of the truck ramp and also tied to a roof downspout at the corner of the main manufacturing building. An 8” line was found to be connected to a roof downspout within the main manufacturing building. In addition, two weep holes or ring lift holes were observed discharging water into the NTD sump when the sump pump was activated, drawing down the water level in the sump. Stormwater may have flowed from the NTD sump out the weep holes to the subsurface when the stormwater sump filled and during periods when the sump pump was not working. Inlet water sampling from the stormwater lines and weep holes was completed during a storm event. Low concentrations of some COPCs were measured in the stormwater inlet samples. Dioxin/furan TEQ concentrations were measured below the PCL based on the laboratory PQL and were comparable in both stormwater inlet samples and the two weep hole samples.

One grab sample of sump solids was also collected. Concentrations of COPCs measured below PCLs. Dioxin/furan TEQ concentrations were measured above the PCL based on the laboratory PQL. Ecology requested a follow-up assessment of soil adjacent to the discharge line of the NTD sump. Two composite soil samples were collected at a disconnected portion of the discharge line, as well as the original terminus of the discharge line. The original terminus of the discharge line was approximately 80’ from the edge of the “finger area.” COPCs were measured below PCLs with the exception of cPAHs and dioxins/furans. The concentration of dioxin/furan TEQ in the discharge line soil samples was comparable to the dioxin/furan TEQ concentration measured from the solids within the NTD sump. Total PCB congeners measured between approximately 30,000 pg/g to 50,000 pg/g and were elevated compared to other composite soil samples collected at the Site; however, Total PCB congeners were below the MTCA Method B direct contact screening level and concentrations were consistent (or lower) than the results of a stormwater source tracing investigation performed by the City of Seattle which measured a median concentration for in-line solids of 98,000 pg/g (King Co, 2016). Potential sources of PCBs identified in the King County research that can enter a stormwater system include: vehicle cleaners/degreasers, vehicle fuels, road paint, asphalt-related products, pesticides/herbicides, hydroseed, and street/sidewalk caulk.

5.3.6 AFFECTED MEDIA AND POTENTIAL EXPOSURE PATHWAYS

Results of the RI indicate that affected media at the Woodlife Area include soil and groundwater and potentially complete exposure pathways for these media in the Woodlife Area are described below.

Soil

The Property is zoned as industrial use and it is likely that industrial activities will continue to occupy the Woodlife Area for the foreseeable future. Potentially complete exposure pathways for soil in the Woodlife Area include:

- Direct exposure by construction workers and industrial workers (e.g. dermal, incidental ingestion) associated with future on-site work or development work to a maximum depth of 15 feet or less.

Shallow groundwater conditions are likely to limit potential future construction worker exposure to soil within less than approximately 5 feet from the ground surface. Due to the presence of asphalt caps, roadways, and structures in the Woodlife Area, the terrestrial ecological exposure pathway is not considered complete.

Groundwater

Groundwater at the Site is not considered potable, as described in Section 5.2.7.

Groundwater impacts are currently contained under existing surface caps, buildings, and roadways, further limiting potential exposure. Sampling of shoreline seeps in the “finger area” indicate that groundwater COPCs are not present in surface water or sediment. Therefore, no complete migration pathways were identified for impacts in the Woodlife Area.

5.3.7 WOODLIFE AREA PROPOSED CLEANUP LEVELS

Site wide COPCs that exceed selected PCLs within the Woodlife Area are co-mingled with Creosote Area COPCs. Based on the potentially complete exposure pathways listed above the following IHS have been selected for the Woodlife Area:

- Dioxin/furan TEQ in soil and groundwater.

Soil and groundwater analytical results for the IHS in the Woodlife Area are presented on Table 5.3-1 and Table 5.3-2.

5.4 KNOLL FILL AREA

A CSM including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Knoll Fill Area is provided below.

5.4.1 HISTORICAL USE

Lands west of the railroad were created by filling of the tidal delta at the confluence of Snohomish River and Possession Sound. The earliest fill records are not available; however, historical aerial photographs show activity along the shoreline to the south of the former Nord Door facility from at least 1938 through the 1960s. Based on a review of historical aerial photographs (see Appendix A), in 1938, the area was developed with one rectangular building (labeled in a 1957 Sanborn map as “fish net storage”), seven longer buildings running perpendicular to the fish net storage building, and a smaller building located to the west and extending out into Port Gardner Bay. By 1947, only the fish net storage building extending into Port Gardner Bay remained. Between 1955 and 1967, a majority of the southern portion of the Site had been cleared and filled. Additional fill activities occurred between 1967 to 1978 that included development of the southern shoreline to its current extent and additional fill in the Knoll Area to create the existing “knoll” feature. This CSM for the Knoll Fill Area encompasses the area of fill placement shown on Figure 5.4-1.

5.4.2 PHYSICAL SETTING

Most of the fill material placed between 1955 and 1967 appears to be dredged sediments composed of sands with shell fragments. The aerial photography shows that the Nord Door plant areas had structures or was paved when the filling along the southern side occurred while the Knoll Area was unpaved and vegetation is not seen in the aerial photographs. Prior to filling in 1965, a historical on-grade work surface and associated structures extended from Marine View Drive over a portion of the historical tide flats prior to Knoll Area fill events. That historical “working surface” is apparent at a depth of approximately 13 feet above mean sea level (aMSL) within the Knoll Area and is now overlain by dredged sediment fill. For reference groundwater seep sample S-16 was surveyed at approximately 7 feet aMSL. A cross section of the Knoll Area is included as Figure 5.4.2-1. No subsurface confining layer or perched groundwater table was observed in groundwater wells to date. During the 2019 transducer study, the tidal influence in the Knoll Area wells was observed to be approximately 0.11 feet at MW-14 (near shoreline) and no change was observed at MW-12 (approximately 100 feet from shoreline). A summary of the 2019 transducer study is included in the 2019 Data Gap Assessment Report (SLR, 2019a). The measured overall groundwater flow is in a west-southwest direction (see Appendix G).

Both Knoll Fill Area upland areas and offshore marine areas were characterized as part of RI activities.

5.4.3 SUSPECTED AND CONFIRMED RELEASES

There is no available information supporting historical suspected or confirmed releases in the Knoll Fill Area, and the likely source of impacts appear related to historical fill activities.

5.4.4 CONTAMINANT FATE AND TRANSPORT

Upon confirming the bluff overburden soils were not a source, an alternative hypothesis was developed that groundwater transport to seeps could be the source to sediments from the Knoll Area. A work plan was developed and groundwater seep survey and groundwater seep sampling were completed at the Site as part of SCE activities in 2018, including adjacent to the Knoll Fill Area (SLR, 2018a; SLR, 2018b). Groundwater monitoring wells were installed and additional dissolved phase groundwater and seep sampling (via SPME samplers) was completed during the 2019 RI and SCE data gap assessment based on the findings of the initial groundwater seep sampling (SLR, 2018b) The SPME study design included two pairs of groundwater seeps and upgradient groundwater wells in addition to 3 unpaired seep stations, allowing for characterization of transport mechanisms (described in Anchor, 2020). The paired SPME sample results reveal that the sediment porewater total dissolved PCB congener concentrations were on average 17 times higher than the groundwater concentrations. This analysis indicates that the groundwater transport pathway is probably not the primary cause of PCB impacts identified in Knoll Area sediment.

Combined characterization data and fill history indicate that the likely source of PCBs in groundwater and in the sediments adjacent to the Knoll Area are associated with buried fill material deposited between 1955 and 1965, prior to additional fill activities that formed the current “knoll” feature, or a surficial release directly to the sediments. As noted, previously, the source of the fill material is unknown. Based on the extensive testing conducted to date, neither of these two possible source alternatives can be ruled out and some uncertainty will be retained throughout the RI/FS process. While risks of erosion are currently low in the Knoll Fill Area, increased sea levels and wind driven waves from storms of increasing intensity could cause significant erosion that could expose an unidentified potential source area in the upland and result in recontamination of sediments after cleanup. It is unlikely that further RI characterization in the upland Knoll Area will provide further insight into the source potential. However, further characterization could be conducted in the remedial design phase, if required to address uncertainty. A contingent remedial action (CRA) will be proposed in the cleanup action plan (CAP) to address the uncertainty and recontamination of the sediment.

5.4.5 NATURE AND EXTENT OF CONTAMINATION

Several rounds of surficial sediment testing were conducted in the marine area offshore of the Knoll Area. The testing revealed concentrations higher than the benthic protection-based SCO of 130 µg/kg for PCBs. In addition, there is a larger area that exceeds the human health based cleanup level of 30 µg/kg for PCBs. These concentration gradients are depicted in Figure 4.3-4. As a result of these exceedances, coring was conducted to determine the thickness of the PCB impacts. Three cores were placed in areas of known exceedance for PCBs allowing for comparison of concentrations from 0- to 0.33-feet, 0- to 2-ft, 2- to 4-ft and 4- to 6-ft intervals. In each completed core the highest concentration was observed in the surface sample. In the two cores immediately offshore of the Knoll Area, the 0-2 foot intervals averaged 4.5 times less than the 0 to 0.33-foot surface concentrations. At all core locations, the results were less than accepted natural background concentrations in the 2- to 4-ft and 4- to 6-ft intervals.

During initial upland RI activities, test pitting and Geoprobe drilling was completed in the Knoll Fill Area. In the uplands, a layer of apparent ash material was encountered in one Geoprobe boring, GP-334 (former “fish net storage” area) from a depth of approximately 3.5 to 7 feet bgs, possibly from historical filling activities. Subsequent test pit excavations completed in the Knoll Area did not identify ash. The observed soil in the test pit excavations and borings in the Knoll Area were characterized as primarily sandy soil with shells and shell pieces down to the apparent underlying native mudflat layer. A portion of a concrete slab underlain by wood debris, metal, glass, and other debris was encountered at a depth of approximately 8 feet bgs in three test pits completed near the center of the Knoll Area (TP-16 to TP-18). Soil samples from the Knoll Area were collected during monitoring well installation of MW-12, MW-13, and MW-14. Zero to twelve feet composite samples were analyzed for PCB congeners. Concentrations of total PCB congeners were comparable at each location (between 320 and 770 pg/g) and were below the calculated

PCL for saturated soil protective of sediment of 1,840 pg/g. Calculations used to develop this PCL are included in Appendix L.

As the initial upland investigation did not reveal a PCB source, a hypothesis was developed that the steep bluff face may be the source of contamination. A study design was planned to collect composite bank soil samples during initial RI activities in 2013 around the perimeter of the Knoll Area (JW-BL-303 to JW-BL-307). These samples were submitted for PCB congeners testing and the total PCB congener of the 5 bluff sample results ranged from 1.2 to 10.6 µg/kg dry weight. These concentrations are below the initial soil PCL, sediment human health and benthic cleanup levels, and most importantly are much lower than concentrations measured in the offshore sediments. Thus, the hypothesis was disproven and overburden soils eroding into the marine area are not a direct source of PCB contamination to the sediments adjacent to the Knoll Area.

5.4.6 AFFECTED MEDIA AND POTENTIAL EXPOSURE PATHWAYS

Results of the RI indicate that affected media at the Knoll Fill Area include groundwater and near-shore sediments. Potentially complete exposure pathways for the Knoll Fill Area are described below.

Soil

The Knoll Fill Area was primarily mudflats and material storage areas prior to the placement of fill soil in the 1960's. The Knoll Area has remained vacant and vegetated since then. The Property is zoned as industrial use and it is possible that construction and industrial activities may occupy the Knoll Area in the future. The on-site extent of the Knoll Fill Area (the Knoll Area plus the adjacent southern shoreline) is paved. It is assumed that the extent of potential exposure to soil impacts is from surface to 15 feet bgs.

Future industrial workers could potentially be exposed via incidental soil ingestion and dermal contact, inhalation of soil particulates, and inhalation of volatiles (indoor air).

Future construction workers could potentially be exposed via incidental soil ingestion and dermal contact, inhalation of soil particulates, and inhalation of volatiles (outdoor air).
Terrestrial ecological receptors could potentially be exposed via soil ingestion and ingestion of a terrestrial prey species (due to plant and animal bioaccumulation).

Groundwater

Groundwater detections of total PCBs have been observed in the shallow unconfined aquifer located within the Knoll Fill Area. Drinking water is not a current exposure route (as explained in section 5.2.7); there are no drinking water wells on the Site and the City of Everett supplies water to this area. Since this area was created through placement of fill soil over saltwater mudflats, the shallow groundwater is expected to be brackish and unusable for drinking water. Use of the shallow groundwater is not included as a potential exposure route in this CSM. Detected PCB concentrations may be indicative of leaching of low-level PCBs from vadose and saturated zone soils or result from tidal pumping of porewater into the aquifer.

While unlikely, future construction workers could potentially be exposed via dermal contact with groundwater and inhalation of volatiles (outdoor).

Future industrial workers could potentially be exposed via inhalation of volatiles (indoor). Terrestrial ecological receptors could potentially be exposed via groundwater ingestion at seep locations where groundwater becomes surface water.

Surface Water and Sediments

Potential exposure pathway to humans is complete as identified in the human health risk-based cleanup level and benthic exceedances.

Future industrial and construction workers could potentially be exposed via dermal contact with surface water at seeps and/or sediments.

Terrestrial ecological receptors could potentially be exposed via ingestion and dermal contact of sediments, ingestion and dermal contact with surface water, and ingestion of an aquatic prey species (due to aquatic organism bioaccumulation). This is discussed in further detail in Section 5.7.

5.4.7 KNOLL FILL AREA PROPOSED CLEANUP LEVELS

As PCB Congeners were measured above the selected PCL in most groundwater sample locations that had another COPC exceed a selected PCL, PCB congeners will be the IHS for groundwater in the Knoll Fill Area (see Table 5.4-1). Significant soil impacts were not identified and are not a driver for potential cleanup alternatives.

The selected PCL for Total PCB congeners of 1,230 pg/L was calculated by using the laboratory PQL for 123 congeners that were identified in a representative site sample, as requested by Ecology.

5.5 PRIMARY EXPOSURE ROUTES AND RECEPTORS

The exposure media are the environmental media through which human or ecological receptors could be exposed to hazardous substances. As described in the above sections and shown on Figure 5, the primary exposure routes and receptors potentially affected by released hazardous substances at the Site include the following:

- On-site soil – Dermal contact with soil, inhalation, and incidental ingestion are the major routes of exposure through which human receptors may potentially be exposed to impacted soil at the Site. Human receptors may include current and future industrial workers and current and future construction workers. The primary means in which terrestrial ecological receptors may potentially come into contact with contaminants are through direct contact with soil and through dietary ingestion. Data collected from the RI does not show evidence of contaminant migration from soil to groundwater and then to surface water in the Creosote Area or the Woodlife Area.
- On-site groundwater – Dermal contact with shallow groundwater is the major route of exposure through which human and ecological receptors may potentially be exposed to impacted groundwater at the Site. Human receptors may include current and future industrial workers and current and future construction workers. Groundwater at the Site does not meet the definition of potable water as outlined in WAC 173-340-720(2) based

on the following factors: a) the groundwater does not serve as a current source of drinking water; and b) the groundwater is not a potential future source of drinking water given the Site's proximity to surface water that is not suitable as a domestic water supply. Therefore, ingestion of groundwater is not considered a potential route of exposure.

- Air – Inhalation of soil contaminants as windblown/fugitive dust or volatilization of soil and/or groundwater contaminants to indoor air are the primary routes of exposure through which human receptors may potentially be exposed to impacted air at the Site. Human receptors may include current and future industrial workers and current and future construction workers.
- Marine Sediment – As discussed in Appendix K, comparisons of Site tissue data with ecological risk benchmarks reveal that there is unlikely to be any potential risk to wildlife exposed to Site COPCs, including foraging for clams adjacent to the Site. However, dietary ingestion of shellfish is the primary exposure route through which human receptors may potentially be exposed to sediment contaminants at the Site.
- Potential human receptors include recreational and/or tribal subsistence fishers. The following scenarios for consumption of fish and shellfish were evaluated:
  - tribal adult consumer of fish (excluding anadromous) and shellfish
  - tribal child consumer of fish and shellfish - including incorporation of early life exposure to cPAHs using Age-Dependent Adjust Factors since they are identified as having a mutagenic mode of action
  - a scenario which combines risks from both childhood and adulthood exposure (i.e. lifetime exposure risks calculated from 6 years as a child and 64 years as an adult)
- Direct contact with marine sediment impacts by human receptors poses a relatively lower risk, especially given the limited access to sediment at this industrial Site. Direct contact and incidental ingestion of sediment scenarios evaluated using Ecology (2019) default values were:
  - tribal adult clam diggers
  - tribal adult net fishers
  - child beach play scenario
- Human health risk assessment calculations are summarized in Appendix K.

5.6 TERRESTRIAL ECOLOGICAL EVALUATION

With the exception of the Knoll Area, the Site is almost entirely covered by buildings and pavement. Maulsby Marsh is located across the road and BNSF railroad tracks to the east of the Site. Exposed soil on the main portion of the Site is limited to small landscaped areas around buildings and around the perimeter of the paved areas; therefore, terrestrial ecological receptors (wildlife, soil biota, and plants) are not considered to be potential receptors within these areas. Analytical results from samples located in unpaved areas did not measure COPCs above the values listed in MTCA Table 749-2 (Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure).

The Site meets TEE Process – Exclusion #2 outlined in WAC 173-340-7491(1)(b) because all soil contaminated with hazardous substances is, and will be, covered by buildings, paved roads, pavement, or other physical barriers (i.e. clean fill) that will prevent plants or wildlife from being exposed, with the exceptions listed above. In addition, the cleanup planned to address human health or possible aquatic impacts will also adequately protect soil biota, plants, and animals.

5.7 SEDIMENT STABILITY

A key element of the CSM at sediment sites is sediment stability, since it can determine the point of exposure to sediment contaminants, and it is also a key factor in evaluating the long-term effectiveness of sediment cleanup actions. As discussed in Section 4.3.3.5, in sediment environments, sedimentation rates and stability characteristics can be determined by analyzing the vertical distribution of relatively short-lived radioactive isotopes in surface and near-surface core intervals. Consistent with geochronology investigations successfully performed at other areas in Puget Sound (e.g., Lefkovitz et al., 1997), geochronology sampling and analysis in the Site area focused on Cs-137, which was released to the atmosphere from nuclear tests in the 1950s/1960s.

The site-specific Cs-137 core data suggest an average contemporary net sedimentation rate (corrected for wood debris) in tidal flat areas of the Site of approximately 0.17 ± 0.08 cm/year (i.e., an average 0.6-inch accumulation over a 10-year period). This is a relatively low average sedimentation rate compared to other sediment cleanup sites in Puget Sound, and suggests that natural recovery processes have been and may continue to be relatively slow. The vertical profile of Cs-137 activity is also indicative of stable sediments (i.e., little vertical sediment mixing) over the past 60 to 70 years (Figure 4.3-9 Cs-137 profile), and suggests that bioturbation of surface sediments is less than 10 cm, and likely less than 4 cm. Thus, the SMS marine sediment default 10 cm bioactive zone is a conservative overestimate of bioturbation at the Site.

6. BASIS FOR CLEANUP ACTION

This section presents the basis for the Site cleanup action. There are two distinct elements that form the basis for the cleanup action: 1) the site-specific cleanup standards; and 2) the locations and media requiring cleanup action evaluation.

6.1 CLEANUP STANDARDS

Cleanup standards consist of: a) cleanup levels for hazardous substances present at the Site; b) the location where these cleanup levels must be met (i.e. point of compliance); and c) other applicable state and federal laws that may apply to the Site.

Under MTCA, the point of compliance is the point or location on a site where the cleanup levels must be attained. The points of compliance for affected media will be approved by Ecology and presented in a forthcoming CAP for the Site. However, it is necessary to identify proposed points of compliance in order to develop and evaluate cleanup action alternatives in the FS. This section describes the proposed points of compliance for soil, groundwater and sediment.

6.1.1 UPLAND SOIL

The process of assessing initial soil PCLs for detected contaminants and subsequent selected PCLs for soil IHS in each primary assessment area are described in Section 4.1.2 and Section 5.0 (CSMs).

6.1.1.1 SOIL CLEANUP LEVELS

Selected PCLs for IHS in soil include the following:

- 0.19 mg/kg for TEQ cPAHs (based on Method B direct contact) in the Creosote Area
- 5.2 pg/g for TEQ Dioxins/Furans (based on natural background concentration) in the Woodlife Area

6.1.1.2 UPLAND SOIL POINT OF COMPLIANCE

The standard point of compliance for the soil cleanup levels will be throughout the soil column from the ground surface to 15 feet bgs in accordance with WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b).

6.1.2 GROUNDWATER

The process of assessing initial groundwater PCLs for detected contaminants and subsequent selected groundwater PCLs for IHS in each primary assessment area are described in Section 4.1.2 and Section 5.0 (CSMs).

6.1.2.1 GROUNDWATER CLEANUP LEVELS

Selected PCLs for IHS in groundwater include the following

- 8.9 µg/L for naphthalene (based on groundwater protective of vapor intrusion) in the Creosote Area
- 72 pg/L for dioxins/furans TEQ (based on laboratory PQL) in the Woodlife Area
- 1,230 pg/L for Total PCB congeners (based on laboratory PQL calculation) in the Knoll Fill Area

6.1.2.2 GROUNDWATER POINT OF COMPLIANCE

For groundwater, the point of compliance is the point or points where the groundwater cleanup levels must be attained for a site to be in compliance with the cleanup standards. Groundwater cleanup levels shall be attained in all groundwaters from the point of compliance to the outer boundary of the hazardous substance plume. Under MTCA, the standard point of compliance for groundwater is throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest depth that could potentially be affected by an activity. For groundwater potentially discharging to surface water, MTCA provides for a conditional point of compliance at the point of discharge of groundwater to surface water. The conditional point of compliance for the Site is the downgradient edge of the property, at the point of entry of groundwater to Port Gardner Bay.

6.2 MARINE SEDIMENT CLEANUP LEVELS

The cleanup standard is defined as the highest of: a) risk-based concentrations, b) natural or regional background concentrations, or c) PQLs. Cleanup standards for marine sediment indicator hazardous substances, total PCBs and dioxin/furan TEQ, are based on the conservative assumption that chemical concentrations in sediments are solely responsible for the chemical concentrations found in shellfish tissues at the Site.

Preliminary sediment cleanup levels for the Site are summarized in Table 6.2-1, and include two risk targets; the more stringent sediment cleanup objective (SCO; e.g., 10^{-6} cancer risk) and the cleanup screening level (CSL; e.g., 10^{-5} cancer risk). Following review of and public comment on this RI/FS as well as the follow-on Cleanup Action Plan (CAP), Ecology will make a final determination of site-specific cleanup levels.

While wood debris (TVS) and bioaccumulative cPAH TEQ are not identified as IHS for the Site, further characterization may be conducted in remedial design during monitoring to enable compliance determinations within the reasonable restoration timeframe.

6.2.1.1 MARINE SEDIMENT REMEDIATION LEVELS

Sediment cleanup remedies in Puget Sound have typically included a combination of remedial technologies applied to different areas of a site. Under both MTCA and SMS, when more than one method of cleanup is used at a site, it may be necessary to establish remedial action levels (RAL) to indicate what concentrations of IHS would be addressed using the different cleanup methods. As discussed in WAC 173-340-355, a variety of methods may be used to develop site-specific RALs under MTCA and SMS. For the purpose of this RI/FS, and specifically to assist in the development of marine sediment remediation alternatives for the FS (see Section 7), preliminary sediment RALs were derived using benthic SCOs and site-specific human health-based sediment SCOs. A “hill-topping” analysis was used to evaluate the relationship between the RAL and the resulting total PCB and dioxin/furan TEQ SWAC at the Site following remediation, assuming natural background replacement values for remediated areas (1.6 µg/kg dw and 1.8 ng/kg dw for total PCBs and dioxin/furan TEQ, respectively). The hill-topping curves presented in Figures 6.2-1 and 6.2-2, respectively, identify RALs that achieve the Site-side SWAC goal.

Higher concentration break points were determined by applying SMS benthic protection levels for total PCBs. Best professional judgement was used for higher concentration break point for dioxins/furans TEQ at 15 ng/kg, based on direct contact levels presented in SCUM (Ecology 2019).

The following concentration break points were identified that provided useful RAL values and that are carried forward in the FS:

- Total PCBs:
    - 30 µg/kg dw (human health protection-based SCO)
    - 117 µg/kg (hill-topping-based RAL to achieve a 30 µg/kg dw SWAC)
    - 130 µg/kg dw (benthic protection SCO)
- Dioxin/Furan TEQ:
    - 5 ng/kg dw (PQL based SCO)
    - 8 ng/kg dw (hill-topping-based RAL to achieve a 5 ng/kg dw SWAC)
    - 15 ng/kg dw (best professional judgment direct contact [Ecology 2019])

6.2.1.2 MARINE SEDIMENT POINT OF COMPLIANCE

For marine sediments, the vertical point of compliance is surface sediments within the biologically active zone. The biologically active zone is the depth in surface sediments within which benthic organisms are found. For most members of the marine benthic community, a 10 cm biologically active zone is considered appropriate under SMS, and site-specific bioturbation depths are less than 10 cm (see Section 4.3.3.5). However, the soft shell clam (*Mya arenaria*) identified in tidal mudflats at the Site may burrow as deep as 30 cm below mudline (Abraham et al., 1986). Therefore, to ensure protection of human health at the Site, the preliminary point of compliance in marine sediments is 30 cm (approximately 1 foot).

The biologically active zone in Site tidal mudflats can potentially include deeper sediments that could become exposed by storms or other events that contribute to erosional forces. However, the vertical profiles of Cs-137 activity measured at the Site are indicative of stable sediments (i.e., little vertical sediment mixing) over the past 60 to 70 years (Figure 4.3-9), and thus the point of compliance does not need to be extended below 1 foot.

For bioaccumulative COPCs such as total PCBs and dioxin/furan TEQ, the horizontal point of compliance defined under SMS is based on the SWAC. SWACs are applied to the entire Site area that exceeds the site-specific sediment cleanup level. Thus, for the purpose of this RI/FS, the SWAC compliance area encompassed all surface and near-surface sediment areas (i.e., to a depth of 1 foot below mudline) with concentrations of total PCBs and/or dioxin/furan TEQ exceeding preliminary SCO chemical criteria. The SWAC area defined in this manner is approximately 16.6 acres. Using IDW methods, the existing SWACs within the Site area are as follows:

- Total PCBs: 36 µg/kg dw (slightly greater than the 30 µg/kg preliminary SCO)
- Dioxin/Furan TEQ: 11 ng/kg dw (more than two times the 5 ng/kg preliminary SCO)

6.2.1.3 Creosote Treated Structures

SCUM (Ecology 2019) identifies the requirement to remove and dispose of creosote-treated piling that are in a cleanup site. Two bulkhead structures containing an unknown number of piles and lagging, a remnant wooden barge, and approximately 45 free standing piling or dolphins have been identified within the Site boundary. As depicted on Figure 3.6, some of the structures and pilings are on properties that are owned by the Wick Family Trust and Port of Everett. For the purposes of this RI/FS, it has been assumed that these structures and pilings in areas targeted for sediment removal will be removed as part of the selected marine remedial action.

Commented [ES(11]: Should reference MTCA language regarding source control. SCUM can be referenced secondarily.

7. FEASIBILITY STUDY

As stated in WAC 173-340-350, the purpose of the FS is to develop and evaluate remedial alternatives that will enable a remedial action to be selected for the Site. This section identifies Site areas requiring cleanup action evaluation, identifies cleanup action objectives, reviews potentially applicable regulatory requirements for the cleanup action, and presents a screening evaluation of general response actions and remediation technologies that are potentially applicable to the Site.

7.1 LOCATIONS REQUIRING CLEANUP ACTION EVALUATION

The following sections describe the media requiring cleanup action evaluation based on the findings of the RI.

7.1.1 UPLAND AREAS REQUIRING CLEANUP ACTION EVALUATION

Upland areas requiring cleanup action evaluation are associated with historical site activities including pole treating using creosote, fuel oil storage, wood treating using Woodlife wood treatment solution, and historical fill activities. The impacts related to fuel oil and creosote contain the same indicator substances (cPAHs and naphthalene) and are co-located along the eastern portion of the former Nord Door site and extending beneath West Marine View Drive. The impacts are generally found between 3 and 15 feet bgs, except for areas of the former creosote tank operations where impacts have been identified to 45 feet bgs and are primarily located below buildings or pavement. Figure 5.2-1 shows areas of soil and groundwater IHS that exceed selected PCLs in the Creosote Area.

Dioxin/furan impacts related to wood treatment using Woodlife solution are located in shallow soil and groundwater in the northeastern portion of the Site. These impacts are generally found at depths to 5 feet bgs and are located below buildings or pavement. Figures 5.3-1 shows areas of soil and groundwater IHS that exceed selected PCLs in the Woodlife Area.

Total PCB congener impacts related to historical fill activities are located in groundwater in the southern portion of the Site, including the Knoll Area. Figure 5.4-1 shows areas of groundwater IHS that exceed selected PCLs in the Knoll Fill Area.
Based on the upland RI findings and consultation with Ecology, the upland FS alternatives were considered for three assessment areas of the Site: 1) Creosote Area; 2) Woodlife Area; and, 3) Knoll Fill Area. As described in Section 5.4, the Knoll Fill Area cleanup alternatives are included in the marine FS alternatives.

Based upon the specifics of the above listed areas (access, depth of contamination, potential receptors, feasibility, etc.) upland cleanup alternatives have been prepared for each area of concern with detailed MTCA evaluations of each alternative. The MTCA evaluation includes a disproportionate cost analysis (DCA) that compares the relative costs and benefits of each alternative presented for the cleanup areas.

7.1.2 MARINE SEDIMENT AREAS REQUIRING CLEANUP ACTION EVALUATION

For purposes of the FS, the marine area was subdivided into sediment management areas (SMAs) so that alternatives could be assembled and evaluated. Exhibit 7.1.2 below describes the various cleanup levels that were used to define the boundaries of the SMAs, which were based on both the preliminary SCO chemical criteria summarized in Table 6.2-1, along with RALs as described in Section 6.2.1.1. Figure 7.1 depicts the layout of SMAs in accordance with the scheme described above.

Exhibit 7.1.2
SMA Designations

DESIGNATION	DIOXIN/FURAN TEQ (NG/KG DW)	TOTAL PCBS (µG/KG DW)	BASIS FOR SELECTION
SMA 1	5	>30 (SCO based on human health risk)	1. Dioxin/Furan TEQ level set by the PQL. 2. Total PCB Level set by the human-health seafood consumption risk level.
SMA 2	8	117 (level at which the SWAC of 30 µg/kg is achieved)	Levels set to achieve a post-construction surface weighted average concentration of 5 ng/kg for Dioxin/Furan TEQ and 30 µg/kg for total PCBs.
SMA 3	15	130 (predicted bulk sediment toxicity SMA)	1. Best professional judgement: Dioxin/Furan TEQ level set at SCUM-defined (Ecology 2019) direct contact. 2. Total PCB level based on the benthic protection sediment management standard dry weight sediment quality objective equivalent.

Notes:
µg/kg = microgram per kilogram
dw = dry weight
ng/kg = nanogram per kilogram
PCB = polychlorinated biphenyl
PQL = practical quantitation limit
SCO = sediment cleanup objective
SMA = sediment management area
SWAC = surface weighted average concentration
TEQ = toxic equivalent quotient

7.2 CLEANUP ACTION OBJECTIVES

Cleanup action objectives consist of chemical- and media-specific goals for protecting the environment. The cleanup action objectives specify the media and contaminants of interest, potential exposure routes and receptors, and proposed cleanup goals.

7.2.1 UPLAND AREA CLEANUP ACTION OBJECTIVES

The cleanup action objectives for the upland areas are to protect human health and the environment by eliminating, reducing, or otherwise controlling risk posed through identified exposure pathways and migration routes. The cleanup action objectives for the upland areas of the Site are to mitigate risks posed by the following exposure routes:

- Prevent direct contact (dermal, incidental ingestion, or inhalation) by industrial or maintenance workers, construction workers, or other Site occupants with hazardous substances in soil, groundwater, or soil gas (via vapor intrusion).
- Prevent contaminated groundwater migration to adjacent marine sediment and surface water via groundwater discharge (seeps or other transport mechanism such as leaky stormwater pipes).
- Protect the human health and environment through removal or treatment of hotspot areas to the extent practicable such that it does not become a hazard in case of a natural disaster, for example, an earthquake

7.2.2 MARINE SEDIMENT AREA CLEANUP ACTION OBJECTIVES

Sediment cleanup action objectives are focused on the following IHS:

- Total PCBs
- Dioxin/Furan TEQ

The cleanup action objective for marine sediments is as follows:

- Eliminate, reduce, or otherwise control, to the extent practicable, risks to humans from ingestion of seafood containing COPCs that exceed risk-based concentrations.
- Meet the cleanup objectives within 10 years of completion of construction.

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Include protection and maintenance of physical environment including habitat areas, aquatic conservancy areas.

7.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In addition to the cleanup standards developed through the MTCA process, WAC 173-340-710 requires cleanup actions to comply with applicable state and federal laws and those requirements identified as applicable or relevant and appropriate requirements (ARARs). Under WAC 173-340-700(6)(a), MTCA requires cleanup standards to be "at least as stringent as all applicable state and federal laws." Besides establishing minimum requirements for cleanup standards, applicable state and federal laws may also impose certain technical and procedural requirements for performing cleanup actions. These requirements are described in WAC 173-340-710. Applicable state and federal laws are discussed below.

The cleanup action at the Site will likely be performed pursuant to MTCA under the terms of a Consent Decree. Accordingly, the anticipated cleanup action will likely meet the permit exemption provisions of MTCA, obviating the need to follow procedural requirements of the various local and state regulations that would otherwise apply to the action. Similarly, the anticipated cleanup action qualifies for a United States Army Corps of Engineers (Corps) Nationwide Permit 38 (NWP 38). Nevertheless, federal consultation under the Endangered Species Act, Section 401 Water Quality Certification, and other substantive requirements must still be met by the cleanup action. Ecology will be responsible for issuing the final approval for the cleanup action, following consultation with other state and local regulators. The Corps will separately be responsible for issuing approval of the project under NWP 38, following Endangered Species Act consultation with the federal Natural Resource Trustees, and also incorporating Ecology's 401 Water Quality Certification.

7.3.1 MTCA AND SMS REQUIREMENTS

The primary law that governs the cleanup of contaminated sites in the state of Washington is MTCA. The MTCA cleanup regulation (WAC 173-340) specifies criteria for the evaluation and conduct of a cleanup action, including criteria for developing cleanup standards for soil. When contaminated sediments are involved, the cleanup levels and other procedures are also regulated by the SMS (WAC 173-204). The SMS were developed to establish cleanup standards for marine and other environments for the purpose of reducing and/or eliminating adverse effects on biological resources and significant health threats to humans from surface sediment contamination. The SMS cleanup standards govern the cleanup of contaminated sediment sites. Both MTCA and SMS regulations require that cleanup actions must protect human health and the environment, meet environmental standards in other applicable laws, and provide for monitoring to confirm compliance with cleanup levels.

MTCA places certain requirements on cleanup actions involving containment of hazardous substances that must be met for the cleanup action to be considered in compliance with soil cleanup standards. These requirements include implementing a compliance monitoring program that is designed to ensure the long-term integrity of the containment system and applying institutional controls where appropriate to the affected area (WAC 173-340-440). The key MTCA decision-making document for cleanup actions is the RI/FS. In the RI/FS, the nature and extent of contamination and the associated risks at a site are evaluated, and potential alternatives for conducting a site cleanup action are identified. The cleanup action alternatives are then evaluated against MTCA remedy selection criteria, and one or more preferred alternatives are selected. After reviewing the RI/FS, and after consideration of public comment, Ecology then selects a cleanup action for the site and documents the selection in a CAP. Following public review of the CAP, the site cleanup process typically moves forward into design, permitting, construction, and long-term monitoring.

This RI/FS report was prepared consistent with the requirements of MTCA and the SMS.

7.3.2 STATE ENVIRONMENTAL POLICY ACT

The State Environmental Policy Act (SEPA; RCW 43.21C; WAC 197-11) and the SEPA procedures (WAC 173-802) are intended to ensure that state and local government officials consider environmental values when making decisions. The SEPA process begins when an application for a permit is submitted to an agency, or an agency proposes to take some official action such as implementing a MTCA CAP. Prior to taking any action on a proposal, agencies must follow specific procedures to ensure that appropriate consideration has been given to the environment. The severity of potential environmental impacts associated with a project determines whether an Environmental Impact Statement (EIS) is required. A SEPA checklist would be required prior to initiating remedial construction activities. Because the Site cleanup action will be performed under a Consent Decree, SEPA and MTCA requirements will be coordinated, where possible.

7.3.3 SOLID AND HAZARDOUS WASTE MANAGEMENT

The Washington Hazardous Waste Management Act (RCW 70.105) and the implementing regulations, the Dangerous Waste Regulations (Chapter 173-303 WAC), would apply if dangerous wastes are generated during the cleanup action. Related regulations include state and federal requirements for solid waste handling and disposal facilities (40 CFR) 241, 257; Chapter 173-350 and 173-351 WAC) and land disposal restrictions (40 CFR 268; WAC 173-303-340).

7.3.4 SHORELINE MANAGEMENT ACT

The Shoreline Management Act (RCW 90.58) and its implementing regulations establish requirements for substantial developments occurring within water areas of the state or within 200 feet of the shoreline. Local shoreline management master programs are adopted under state regulations, creating enforceable requirements. Because the Site cleanup action will likely be performed under a Consent Decree, compliance with substantive requirements would be necessary, but a shoreline permit would not likely be required.

7.3.5 PUGET SOUND DREDGED MATERIAL MANAGEMENT PROGRAM

In Puget Sound, the open water disposal of sediments is managed under the Dredged Material Management Program (DMMP). This program is administered jointly by the Corps, EPA, Washington Department of Natural Resources (DNR), and Ecology. The DMMP developed the Puget Sound Dredged Disposal Analysis protocols, which include testing requirements to characterize whether dredged sediments are appropriate for open-water disposal. The results of this characterization are formalized in a written suitability determination from the Dredged Material Management Office. The DMMP has also designated disposal sites throughout Puget Sound. If DMMP disposal of sediments dredged from the Site were to be included as part of the final cleanup remedy, dredged material characterization would be required to complete the suitability determination. Use of DMMP open-water disposal facilities would need to comply with other DMMP requirements including material approval, disposal requirements, and payment of disposal site fees.

7.3.6 WASHINGTON HYDRAULICS CODE

The Washington Hydraulics Code (WAC 220-110) establishes regulations for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. The code also creates a program requiring Hydraulic Project Approval (HPA) permits for any activities that could adversely affect fisheries and water resources. Timing restrictions and technical requirements under the hydraulics code are applicable to dredging, construction of sediment caps, and placement of post-dredge residual covers if necessary. For the reasons stated above, the procedural requirements of an HPA permit would not likely be required, although the substantive requirements of an HPA must still be met by the cleanup action.

The FS has been prepared using costs and durations that recognize potential fish closure periods, during which time dredging and any in-water work will not be permitted. Exact in-water closure periods will be determined through agency consultation.

7.3.7 WATER MANAGEMENT

7.3.7.1 CLEAN WATER ACT

The Clean Water Act (CWA) is the primary federal law for protecting water from pollution. The CWA regulations provide requirements for the discharge of dredged or fill material to waters of the United States and are applicable to any in-water work. The CWA regulations also prescribe permitting requirements for point source and non-point source discharges. Acute marine criteria are relevant and appropriate requirements for discharges to marine surface water during sediment dredging, as well as for return flows (if necessary) to surface waters from dewatering operations.

Section 404 of the CWA requires permits from the Corps for discharges of dredged or fill material into waters of the United States, including wetlands. Section 404 permits depend on suitability determinations (described previously) according to DMMP guidelines. Section 404(b)(1) requires an alternatives analysis as part of the permitting process. Requirements for all known, available, and reasonable technologies for treating wastewater prior to discharge to state waters are applicable to any dewatering of marine sediment prior to upland disposal. Section 401 of the CWA requires the state to certify that federal permits are consistent with water quality standards. The substantive requirements of a certification determination are applicable.

Ecology has promulgated state-wide water quality standards under the Washington Water Pollution Control Act (RCW 90.48). Under these standards, all surface waters of the state are divided into classes (Extraordinary, Excellent, Good, and Fair) based on the aquatic life uses of the waterbodies. Water quality criteria are defined for different types of pollutants and the characteristic uses for each class of surface water. The standards for marine waters will be applicable to discharges to surface water during sediment dredging and return flows (if necessary) to surface waters from dewatering operations.

The SMS acknowledges the Washington Water Pollution Control Act as the primary authorizing legislation for establishing sediment source control standards.

7.3.7.2 CONSTRUCTION STORMWATER GENERAL PERMIT

Construction activities that disturb 1 acre or more of land need to comply with the provisions of construction stormwater regulations. Operators of regulated construction sites are required to:

- Develop stormwater pollution prevention plans;
- Implement sediment, erosion, and pollution prevention control measures; and,
- Obtain coverage under a Construction Stormwater General Permit.

The permit also requires that Site inspections must be conducted by a Certified Erosion and Sediment Control Lead. This is typically an individual who works for the contractor performing the work.

7.3.7.3 CONSTRUCTION AND MAINTENANCE OF WATER WELLS

Minimum standards for construction and maintenance of water wells are established in Chapter 18.104 RCW and WAC 173-160-101, 121, 161 to 241, 261 to 341, and 381. This regulation is potentially applicable to wells constructed for groundwater withdrawal and monitoring or remediation system components. This regulation is also potentially applicable to the decommissioning of existing or future wells.

7.3.8 AIR CONTAMINANT SOURCES

The Washington Clean Air regulations require that owners and operators of fugitive dust sources take reasonable precautions to prevent fugitive dust from becoming airborne and to maintain and operate the source to minimize emissions under General Regulations for Air Contaminant Source, Chapter 70.94 RCW; WAC 173-400-040(8); and Puget Sound Clean Air Agency (PSCAA) Regulation 1, Section 9.15. PSCAA regulations identify specific requirements related to the control of fugitive dust, including the requirement to employ reasonable precautions to minimize emissions. Reasonable precautions include, but are not limited to, the following: a) the use of control equipment, enclosures, and wet (or chemical) suppression techniques, as practical, and curtailment during high winds; b) surfacing roadways and parking areas with asphalt, concrete, or gravel; c) treating temporary, low-traffic areas (e.g., construction sites) with water or chemical stabilizers, reducing vehicle speeds, constructing pavement or riprap exit aprons, and cleaning vehicle undercarriages before they exit to prevent the track-out of mud or dirt onto paved public roadways; or d) covering or wetting truck loads or allowing adequate freeboard to prevent the escape of dust-bearing materials. For cleanup action alternatives that could result in fugitive dust emissions, those emissions will be minimized per the Washington State and PSCAA requirements.

7.3.9 LOCAL REQUIREMENTS

The following is a list of other potentially applicable local requirements for the cleanup action:

Washington State Shoreline Management Act and City of Everett Shoreline Master Program (SMP), RCW 90.58, WAC 173-27-060, City of Everett Ordinance 3053-08 and SMP. The Shoreline Management Act and City of Everett SMP require a permit for any development or activity valued at $5,000 or as adjusted by inflation by the state legislature or where exempt under RCW 90.58.030(3)(e). Shorelines are defined as lakes (including reservoirs) of 20 acres or greater; streams with a mean annual flow of 20 cubic feet per second or greater; marine waters plus an area landward for 200 feet measured on a horizontal plane from the ordinary high water mark; and all associated marshes, bogs, swamps, and river deltas. Cleanup actions under MTCA are exempt from Shoreline Management Act permitting under MTCA and WAC 173-37-040(3). For upland cleanup action alternatives that include activities within 200 feet of the shoreline and marine cleanup action alternatives, this requirement will meet the substantive requirements. Consultation with the City of Everett will be conducted to meet the substantive requirements.

City of Everett Stormwater and Storm Drainage, Ordinance 2196-96, amending Title 14.28, Effective February 15, 2010; City of Everett Stormwater Management Manual, dated February 2010. The City of Everett ordinance specifies requirements for the management of stormwater and development of storm drainage systems for new and redeveloped properties. These requirements include meeting Minimum Technical Standards, which may include some or all of the following based upon the size of the addition of the impervious surface: erosion and sediment control for all sized projects, for projects adding more than 5,000 square feet of impervious surface: 1) development of a Stormwater Site Plan, Construction Stormwater Pollution

Prevention Plan, Large Parcel Erosion and Sediment Control Plan and Drainage Plan; 2) apply erosion and sediment controls; 3) preserve natural drainage; 4) apply source control Best Management Practices (BMPs); 5) apply runoff treatment BMPs where the project creates 5,000 square feet or more of net additional pavement; treatment BMPs shall be sized to capture and treat a 6-month, 24-hour return period storm; 6) off-site analysis and mitigation; and 7) operation and maintenance. The applicability of the substantive requirements of the stormwater and storm drainage ordinance will be determined through consultation with the City of Everett during the design phase of the selected cleanup action and any substantive requirements will be incorporated into the design documents.

City of Everett Grading Code, Title 18.28.200 Everett Municipal Code (EMC); Title 18.28 EMC, Land Division Evaluation Criteria and Development Standards. The City of Everett requires a grading plan to be submitted to the city engineer “before any site modification where existing natural features would be disturbed or removed” (EMC 18.28.200(A)). The EMC establishes minimum standards for clearing and grading, generally based on following “sound engineering techniques.” The EMC states, in relationship to environmentally sensitive areas, that “Clearing and grading limits shall be established so as to not impact environmentally sensitive areas, the required buffers, and adjacent properties” (EMC 18.28.200(E)(4)) and that “on projects that have environmentally sensitive features and in critical drainage areas, clearing and grading and other significant earth work may be limited to a specific time period as determined by the city” (EMC 18.28.200(F)). The applicability of the substantive requirements of the grading code will be determined through consultation with the City of Everett during the design phase of the selected cleanup action and any substantive requirements will be incorporated into the design documents.

City of Everett Traffic Code, Title 46 EMC. Construction activities such as haul truck operations or installation of remediation systems within the public roadway may require that traffic be directed by flaggers and signage. The applicability of the substantive requirements of the traffic code will be determined through consultation with the City of Everett during the design phase of the selected cleanup action and any substantive requirements will be incorporated into the design documents.

City of Everett Discharge to POTW Title 14.40 EMC. Dewatering activities associated with the cleanup action alternatives involving hydraulic dredging will require a wastewater discharge permit to discharge water to the publicly owned treatment works (POTW). The applicability of the substantive requirements of the Title 14.40 EMC will be determined through consultation with the City of Everett during the design phase of the selected cleanup action and any substantive requirements will be incorporated into the design documents.

7.3.10 OTHER POTENTIALLY APPLICABLE REGULATORY REQUIREMENTS

The following is a list of other potentially applicable regulations for the cleanup action:

Archeological and Historical Preservation. The Archeological and Historical Preservation Act (16 USC 496a-1) would be applicable if any subject materials are discovered during Site grading and excavation activities.

Health and Safety. Site cleanup-related construction activities would need to be performed in accordance with the requirements of the Washington Industrial Safety and Health Act (RCW

49.17) and the federal Occupational Safety and Health Act (29 CFR 1910, 1926). These applicable regulations include requirements that workers are to be protected from exposure to contaminants and that excavations are to be properly shored.

Endangered Species Act. The Endangered Species Act (16 USC 1531-1543, 50 CFR 402, 50 CFR 17) protects fish, wildlife, and plants that are threatened or endangered with extinction.

These requirements are not specifically addressed in the detailed analysis of cleanup action alternatives because they could be met by each of the alternatives.

8. SCREENING OF GENERAL RESPONSE ACTIONS

This section presents a screening evaluation of potentially applicable response actions and remediation technologies to be considered for the cleanup action. As described in WAC 173-340-350 8(b), an initial screening of alternatives may be appropriate to reduce the number of alternatives for the final detailed evaluation. Alternatives that may be eliminated from the FS include: a) alternatives for which costs are clearly disproportionate under WAC 1730340-360 (3)(e); and b) alternatives or components that are not technically possible at the site.

The screening evaluation is carried out for each of the environmental media (soil, groundwater, soil gas, and sediment) requiring cleanup action evaluation. Based on the screening evaluation, selected response actions and technologies are carried forward for use in the development of cleanup action alternatives (Section 8.4).

8.1 UPLAND CLEANUP ACTIONS

This section summarizes various remediation technologies that were screened and evaluated in various combinations as alternatives for the upland areas of the Site. In Section 8.4, alternatives and the key components are described, including conceptual-level corrective actions.

The remediation technologies considered or employed in those alternatives are described below.

8.1.1 NO ACTION

The No Action alternative would consist of refraining from conducting response actions or applying any remedial technology to the upland soil, groundwater, or soil gas impacts identified at the Site. The No Action alternative would not achieve the threshold remedial action requirements of protecting human health and the environment by eliminating, reducing, or otherwise controlling risk posed through identified exposure pathways and migration routes and was not retained for further evaluation.

8.1.2 MONITORED NATURAL ATTENUATION/LONG-TERM MONITORING (MNA)

The MNA alternative relies on naturally occurring attenuation processes to reduce the toxicity, mobility, and volume of contaminants in soil and groundwater at the Site to supplement alternatives that include full removal of impacted soil. Long-term monitoring would be performed for alternatives that do not include full removal of impacted soil or partial removal to demonstrate that contaminant reduction is occurring and that the remedial action objectives are being achieved. MNA can also be a remedy component after the successful completion of an active treatment remedy. The use of MNA/long-term monitoring in combination with other remediation technologies is retained for further evaluation.

8.1.3 INSTITUTIONAL CONTROLS (IC)

Institutional controls are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Institutional controls can play an important role in the cleanup process by reducing potential exposure to contamination and preventing activities that pose exposure risk. Institutional controls are typically used in conjunction with the overall cleanup remedy. Zoning and deed restrictions, public property notices, soil management plans, and other administrative and legal notices are examples of institutional controls. The use of institutional controls is a technology retained for further evaluation.

8.1.4 ENGINEERING CONTROLS (EC)

8.1.4.1 SURFACE CAPPING

This alternative consists of constructing an engineered cap to provide a physical barrier to direct contact with contaminated materials for human and ecological receptors. The cap would also prevent infiltration of stormwater that may potentially cause leaching and migration of contaminants. Potential capping materials could include a variety of low-permeability materials including asphalt, concrete, clay, synthetic materials, or a combination of one or more of these materials. The presence of the capping material can provide a warning to avoid excavation in areas where contamination is present. Capping is a technology retained for further evaluation for controlling risk posed through identified exposure pathways.

8.1.4.2 HYDRAULIC BARRIER

This alternative consists of constructing an engineered containment barrier to prohibit the migration of contaminated groundwater. Potential containment barriers could be constructed of impermeable materials such as high-density polyethylene (HDPE) or concrete/slurry which provides hydraulic control. Given the relatively high cost of this alternative and that the main objective is to limit the migration of contaminated groundwater, which is not identified as a significant exposure pathway, this technology is not retained for further evaluation for upland Site conditions.

8.1.5 IN-SITU TREATMENT

8.1.5.1 IN-SITU CHEMICAL OXIDATION (ISCO)

This alternative consists of the injection of oxidizing chemical compounds into the groundwater to treat the contaminated groundwater through chemical reactions (i.e. sodium persulfate mixed with water). The effectiveness of ISCO treatment is dependent on the local hydrogeology, contaminant concentration, concentrations of other organics in the subsurface, and chemical make-up. Long term monitoring would be performed to demonstrate that contaminant reduction is occurring and that the remedial action objectives are being achieved. The amount of chemical oxidant demand and residual product in the subsurface can significantly reduce the effective radius of injections during ISCO. ISCO is a treatment technology retained for further evaluation.

8.1.5.2 IN-SITU BIODREMEDIATION (ISB)

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This technology involves injecting electron acceptors – such as oxygen, sulfate, and nitrate along with other nutrients to stimulate the existing subsurface bacterial community that is degrading hydrocarbons present in the groundwater. Bioremediation can be accomplished aerobically using oxygen or anaerobically using sulfate or nitrate. Aerobic bioremediation is more efficient and

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typically will proceed faster than anaerobic bioremediation, however the amount of oxygen that can be added to the subsurface is limited by the solubility of oxygen. Although anaerobic degradation proceeds slower than aerobic degradation, the solubility of sulfate and nitrate in water is much higher than oxygen. This allows a greater concentration of electron acceptor to be injected and hence reduces the number of injections that are required to degrade a given hydrocarbon mass. However, the complexities and cost of adding these alternate electron acceptors may be much higher than using oxygen from injected air.

A hybrid approach using air injection wells that operate similarly to an air sparging system along with recirculating a nitrate based nutrient solution along with surfactants is anticipated to be the most successful methodology for bioremediating the contaminants at the Site (absent site-specific pilot testing to test mixtures). The injected air would provide a large amount of oxygen (in air) to the subsurface at a relatively low cost, while the recirculating nitrate system would provide higher concentrations of electron acceptor to areas of higher hydrocarbon concentrations that are likely to remain anaerobic.

This technology typically introduces the electron acceptor through injection points, horizontal recirculation well fields, or vertical recirculation wells. With the relatively coarse-grained materials at this Site the use of horizontal and vertical injection wells would likely be an effective method to introduce the electron acceptors into the groundwater. This alternative is retained for further evaluation.

8.1.6 PERMEABLE REACTIVE BARRIER (PRB)

This alternative consists of injecting a mixture of micron-sized activated carbon that is combined with a blend of sulfate material and micronutrients designed to encourage remediation through biological and microbial processes into the formation downgradient of a groundwater plume. Dissolved contamination in the subsurface would be sorbed by the activated carbon and then the added electron acceptors enhance the degradation of the contamination. The treatment occurs through a biological process that can work with or without the presence of subsurface oxygen. The effectiveness of this technology is dependent on the local hydrogeology and the ability to distribute the mixture, contaminant concentration, and chemical make-up. Long term monitoring would be performed to demonstrate that contaminant reduction is occurring and that the remedial action objectives are being achieved. Depending on the amount of oxygen (or other electron acceptors) and hydrocarbons in the groundwater, the carbon barrier would require additional applications of electron acceptors every few years.

This technology performs similarly to a hydraulic barrier in that it will prevent migration of contaminants in groundwater, but can also destroy hydrocarbons that bind to the activated carbon; however, given the that the main objective of this technology is to limit the migration of contaminated groundwater, which is not identified as a significant exposure pathway, this technology is not retained for further evaluation.

8.1.7 PUMP AND TREAT (P&T)

Pump and treat involves extraction of groundwater from an aquifer and treatment of the water above the ground. The extraction step is usually conducted by pumping groundwater from wells or a trench. The treatment step can involve a variety of technologies such as adsorption, air stripping, bioremediation, chemical treatment, filtration, and ion exchange. The effectiveness of pump and treat technology is dependent on the local hydrogeology, contaminant concentrations and distribution in the subsurface, and chemical make-up. Long term monitoring would be performed to demonstrate that contaminant reduction is occurring and that the remedial action objectives are being achieved. Pump and treat treatment technology was retained in conjunction with other alternatives (i.e. removing contaminated groundwater that enters excavation areas) but was not retained for further evaluation as an independent option because of the observed low mobility of the contaminants in soil and groundwater at the Site.

8.1.8 SOIL VAPOR EXTRACTION (SVE)

SVE is used to remediate unsaturated (vadose) zone soil. A vacuum is applied to the soil to induce a controlled flow of air and remove volatile and some semi-volatile organic contaminants from the soil. The vacuum is typically applied with a blower or vacuum pump connected to soil vapor extraction wells, trenches, or horizontal piping installed in the subsurface. SVE may be used in conjunction with air sparging (describe below), serving to remove contaminated vapors produced by the air sparging process. An often-used variant of SVE is sub-slab depressurization (SSD) which is used to prevent vapors from migrating from the subsurface into an indoor space. SSD is retained for further evaluation and SVE is not retained as a standalone alternative but may be used in conjunction with other technologies.

8.1.9 AIR SPARGING (AS)

Air sparging (AS) is used to remediate volatile and biodegradable contaminants in the saturated zone. Air is injected directly into the groundwater to volatilize contaminants into the vadose zone, which can then be removed with SVE. It also is a means of adding oxygen to the subsurface which can accelerate the biological degradation of hydrocarbons. Nutrients and surfactants can be added through sparge wells or injected separately to further enhance biological degradation of the hydrocarbons. Air sparging is performed in-situ with injection wells. Use of air sparging where there is significant separate phase product may cause unpredictable migration of the product. Air sparging treatment technology is not retained as a standalone treatment technology but is considered for use in conjunction with other treatment technologies.

8.1.10 SOIL REMOVAL

This alternative consists of excavation and off-site disposal of impacted soil at an off-site engineered facility. To access areas of soil impacts, this alternative could potentially include removal of select areas of surface pavement, private and public roadways and sidewalks; or building floor slabs. Components of soil removal would include excavation and off-site disposal of contaminated soil; confirmation sampling; replacement of excavated material with clean fill; and regrading and repaving excavated areas. Due to the construction of the existing main manufacturing building (wall and interior support columns on pilings) it is likely that demolition of the building would be required to excavate soil below the groundwater table. Building demolition may necessitate abatement of potential asbestos-containing material (ACM), and/or potential lead-based paint.

Due to the shallow groundwater table, the potential for flowing sands, and the highly transmissive nature of the sands beneath the Site, technically practicable excavation depths are limited to approximately 15 feet below ground surface or less. Removal of contaminated soil below the groundwater table by excavation will likely require removal and backfilling in wet conditions (digging in an open pit through the water). Even at excavations depths less than 15 feet bgs, excavation practices would require additional shoring, ground improvement, or other support (e.g. ground freezing) to prevent settlement and/or damage to adjacent roadways, utilities, and structures. Constructing an encircled excavation area with sheet-piling and dewatering areas could result in bottom-heave of sand flows, resulting in soil failures outside the excavation area. Contaminated soil removal was retained for further evaluation.

8.1.11 IN-SITU SOIL STABILIZATION / SOLIDIFICATION (ISS)

This alternative reduces the mobility of contaminants in the environment through either physical or chemical means. This class of treatment technologies may not reduce toxicity, but they control risk by eliminating exposure pathways or migration routes. Typical field applications may include large auger or grout-injection systems to mix impacted soil with stabilizing agents for solidification. Soil stabilization technology may be implemented below the water table.

Solidification and/or stabilization ranks above average for inorganic COPCs and average for SVOCs[2]. Stabilization technologies require significant disturbance at the Site in order to implement, would likely require demolition of the building, can alter groundwater flow in the subsurface, impede future installation of subsurface utilities, and can carry high per cubic yard unit cost for soil treated. For shallow soils, these technologies may not be cost effective when compared against soil excavation and disposal. In-situ soil stabilization/solidification (ISS) treatment technology is retained for further evaluation, specifically for on-site impacts to 15 feet bgs. It should be noted that stabilization/solidification is also taken into consideration for ISCO/bio options as the in-situ processes in those technologies will likely preferentially remediate the lighter phase hydrocarbons, leaving a comparatively even less soluble and less volatile source, in essence leaving it stable and solidified in place.

8.1.12 THERMAL TREATMENT (TT)

In-situ thermal technology uses a heater system (e.g. electrical resistive heating [ERH] or steam injection [SI]) to increase the volatilization rate of volatile and semi-volatile constituents to facilitate extraction with a multi-phase extraction system. Heavier contaminants that are heated by contact with heated groundwater or steam become more mobile and are captured by multi-phase extraction points as vapor or liquid.

In-situ thermal treatment rates are above average for all organic COPCs and below average for metals. In-situ thermal treatment typically responds to large and continuous areas of subsurface contamination that allows for the effects of the treatment technology to be transmitted with minimal required infrastructure. ERH performs well at sites where contaminants are trapped in fine grained units (e.g. silt and clay) that are more electrically conductive. At the Site, where there are few fine-grained units, SI would likely be the preferred method of thermal treatment. Although costly, installation of a SI system under West Marine View Drive and near the BNSF railroad corridor is possible with temporary road closures, construction of temporary roadways, and protection of

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[2] Federal Remediation Technologies Roundtable Table 3-2, Treatment Technologies Screening Matrix, March 2007.

utilities. Installation of a SI system on-property would likely not require full removal of the building but would require protection of utilities and structures and careful planning for vapor recovery. In-situ thermal treatment technology via SI was retained for further evaluation.

8.1.13 HIGH VACUUM MULTI PHASE EXTRACTION (HVMPE)

Multi-phase extraction is a combined system that uses both a high vacuum system and dewatering to remove contaminated groundwater and treat soil through vapor extraction. Extracted liquids and vapor are treated and collected for disposal or treated and re-injected where permitted.

Multi-phase extraction is rated above average for all COPCs except inorganics, which are rated below average. A multi-phase system at the Site is not expected to perform well compared to other available treatment technologies due to the low vapor pressure of the creosote and PAHs present in the subsurface. In addition, considering the highly transmissive sands at the Site and the proximity to a surface water, it is unlikely that the Site could be significantly dewatered without pumping and treating at very high rates. Also, the sands beneath the site are so transmissive that it is unlikely that a high vacuum could be maintained during extraction which would be necessary to promote volatilization of the target organics. High Vacuum Multi-Phase Extraction (HVMPE) is used during SI as a means to capture vapor, product, and water driven by the steam injections. HVMPE is not retained as a standalone treatment alternative but would be used in conjunction with thermal treatment technologies.

8.2 SEDIMENT CLEANUP ACTIONS

This section presents a screening evaluation of potentially applicable general response actions and remediation technologies for marine sediments at the Site. Based on the screening evaluation, selected response actions and technologies are carried forward for use in the development of cleanup action alternatives for sediments. Table 8.2 provides a summary of this screening evaluation.

8.2.1 NO ACTION

The No Action alternative for sediments does not achieve the sediment cleanup action objective of protecting human health; thus, it is not retained for further evaluation.

8.2.2 INSTITUTIONAL CONTROLS

For any aquatic construction project (e.g., dredging), environmental reviews are conducted by permitting agencies including the Corps, Ecology, and other resource agencies. These reviews include a review of area files relating to sediment conditions and requirements to address materials management and water quality.

Additional institutional controls may be implemented as appropriate, depending on the selected cleanup action alternative. Such additional controls could include restricting activities with potential for human exposure using site security measures, physical barriers, restrictive covenants for platted tidelands, use authorizations for state-owned aquatic lands, and/or documenting the Site cleanup action in Corps and regulatory agency permit records and records maintained by the State of Washington for state-owned aquatic lands.

Institutional controls can be an effective, implementable, and cost-effective method to control potential exposure and protect human health, provided that the cleanup action for which the institutional controls are implemented is consistent with marine land and navigation uses. In cases where the proposed cleanup action is incompatible with land use or navigation uses, conflicts can result, which can jeopardize the effectiveness of institutional controls or require mitigation.

While the use of institutional controls is not carried forward in this FS as an independent remedial alternative for detailed evaluation, the use of institutional controls may be appropriate in combination with other general response actions for sediments, and thus would be considered as an additive requirement where appropriate.

8.2.3 MONITORED NATURAL RECOVERY

Monitored natural recovery (MNR) relies on net sedimentation as well as natural biodegradation processes to reduce risks following source control, while monitoring recovery over time to verify remedy success (Magar et al., 2009). MNR lines of evidence can be developed from analysis of Site data that characterize the role of natural processes in reducing risk. Key factors for determining whether MNR is an appropriate remedy include the ability to achieve and sustain an acceptable level of risk reduction through natural processes within an acceptable period of time (within 10 years of completion of construction, in accordance with SMS).

Predicting future natural recovery rates requires site-specific inputs to numerical models, such as the net sedimentation rate (which averages approximately 0.17 ± 0.08 cm/year, as described in Section 4.3.2.2.6), to quantify processes described in the CSM and associated lines of evidence. Numerical models can be used to develop estimates of time to recovery using baseline data to determine the likely effectiveness of MNR implementation.

A key element of MNR as a sediment remediation technology is ensuring effective source control. As discussed in Section 5, the RI/FS data reveal that the recontamination potential of current Site upland areas is not significant. Sediment dioxin/furan concentrations that exceed cleanup levels are due to historical legacy releases (e.g., hog fuel burner emissions from historical wood products manufacturing operations in the Site vicinity).

The Site has relatively low average sedimentation rates compared to other sediment cleanup sites in Puget Sound, suggesting that natural recovery processes have been and may continue to be relatively slow. As such, MNR may be more appropriate within certain areas of the Site than in others. The following areas may be most suited to MNR:

- Areas where recontamination from source areas is not a significant concern
- Areas where COC concentrations are low enough that natural recovery can be achieved within 10 years under natural net sedimentation and biodegradation rates (i.e., where SWACs would meet human health or PQL-based RALs, assuming post-construction replacement values for remediated areas)

- Areas where restrictions associated with certain institutional controls are not compatible with future land use, property ownership, or navigation requirements.

8.2.4 ENHANCED MONITORED NATURAL RECOVERY

Enhanced monitored natural recovery (EMNR) involves active measures, such as the placement of a thin layer of suitable sand or sediment, to accelerate the natural recovery process. EMNR is often applied in areas where natural recovery may appear to be an appropriate remedy, yet the rate of sedimentation or other natural processes is insufficient to reduce potentially unacceptable risks within an acceptable timeframe (EPA, 2005). The acceleration of natural recovery most often occurs due to burial and/or incorporation and mixing of the clean material into the contaminated surface sediments through bioturbation and physical mixing processes. Other recovery processes can also occur, such as binding of contaminants to organic carbon in the clean material, particularly if the material is from a clean sediment source with naturally occurring organic carbon. Placement of such EMNR materials is typically different than capping because it is not designed to provide long-term isolation of contaminants. Clean sand or sediment can be placed in a relatively uniform thin layer over a contaminated area, or it can be placed in berms or windrows, allowing natural sediment transport processes to distribute the clean material over wider areas. As with MNR, EMNR includes both monitoring and contingency plan components to verify that recovery is occurring as expected, and to respond accordingly.

EMNR can be highly effective where natural recovery is occurring, but at a slower rate than desired. Given the relatively low net sedimentation rates in the Site area (i.e., approximately 0.17 ± 0.08 cm/year; see Section 4.3.2.2.6), EMNR may be particularly applicable to much or all of the tidal mudflat area. EMNR is also been used throughout Puget Sound as an effective strategy for managing dredge residuals, as discussed below. EMNR has been retained as a general response action for this FS and would include placement of a nominal 6- to 12-inch-thick layer of clean sediment.

EMNR material would be obtained from a clean upland source or marine beneficial reuse sediment source. A specific source for this material has not been identified for this FS. Prior project experience suggests that the availability of clean material from local or regional beneficial reuse projects changes over time, and thus the availability of sources would need to be more fully understood and evaluated during remedial design. If material is only available on a limited basis each year, this could extend the implementation timeline of those projects that require larger volumes of EMNR sediments.

EMNR placement is more appropriate for certain areas than others. It is particularly applicable to much of the tidal mudflats within the Site because it is best suited to the following:

- Areas where recontamination from source areas is not a significant concern
- Areas where COC concentrations are low enough that natural recovery can be achieved within 10 years when accelerated by the addition of a thin, clean layer of EMNR material
- Areas where restrictions associated with institutional controls are not compatible with future land use, property ownership, or navigation requirements
- Flat or shallow sloping areas with stable sediments

- Areas where EMNR material can be placed in the dry, minimizing water quality impacts and ensuring placement accuracy

8.2.5 IN-SITU TREATMENT

In-situ treatment via contaminant immobilization is an innovative sediment remediation approach that involves introducing sorbent amendments into contaminated sediments to alter sediment geochemistry, increasing contaminant binding and therefore decreasing bioavailability. As discussed in Section 4.3.3.2, the existing sequestering capacity of Site sediments can be augmented through the placement of engineered black carbons such as activated carbon to further reduce bioavailability in-situ. Bench- and field-scale application of activated carbon at other sediment sites suggests that porewater concentrations and bio-uptake of hydrophobic contaminants such as PCBs and dioxins/furans can be reduced between 70% and 99% at activated carbon doses similar to the native organic carbon content of sediment (Ghosh et al., 2011). More than 25 field-scale demonstration or full-scale activated carbon sediment in-situ sediment treatment projects spanning a range of environmental conditions have now either been completed or are currently underway in the United States and Norway (Patmont et al., 2015).

Field-scale projects have demonstrated the efficacy of full-scale in-situ sediment immobilization treatment technologies to reduce the bioavailability of hydrophobic contaminants such as PCBs and dioxins/furans. The basic technology involves placement of targeted amendments using a range of options, all of which have now been demonstrated at the field scale, including:

- Direct application of activated carbon, with or without binder and weighting agents
- Mixing amendments with sediment or sand either in-situ or as an amended cover/cap
- Placement of amendments below cover materials or caps

In-situ immobilization treatment can be a permanent sediment cleanup remedy that rapidly and sustainably addresses bioaccumulation exposures, and becomes more effective over time (Ghosh et al., 2011). In-situ treatment is also less energy-intensive, less disruptive to the environment, and can be significantly less expensive than conventional remedial technologies such as engineered containment or removal. For example, a field demonstration of this technology was recently completed in San Francisco Bay by applying approximately 2% to 3% activated carbon and mechanically mixing the material into the top 1 foot of tidal mudflat sediments during low tide conditions, successfully reducing PCB bioavailability with relatively minimal construction-related impacts (Cho et al., 2009). In-situ sediment treatment using activated carbon placement may be particularly promising in sensitive habitat areas such as the Site tidal mudflats.

In-situ treatment is most effective in areas with higher bioavailability of contaminants. The bioavailability of PCBs and dioxins/furans in sediments at the Site has been determined to be relatively low based on low site-specific BSAFs (see Section 4.4.1). Due to the low site-specific bioavailability calculated for PCBs and dioxins/furans in sediments at the Site, in-situ treatment was not retained as a general response action for this FS.

8.2.6 ENGINEERED CONTAINMENT

Commented [ES(16]: This section is light on discussion regarding long-term maintenance and monitoring of engineered caps.

Engineered containment for sediments involves placing a suitable cap to isolate contaminated material to protect biological receptors of interest (e.g., soft shell clams) that may be consumed by humans. In the aquatic environment, the containment must be designed to withstand erosive forces generated by wave action and propeller wash, and must be thick enough to provide the required isolation of the material contained by the cap. Monitoring results at other sites in the Puget Sound region have shown that containment can provide effective sediment remediation without the risks involved in removing contaminants by dredging (Sumeri, 1996). Engineered containment was retained for further evaluation in this FS.

Placing a layer of cap material (1 to 2 feet thick, depending on location-specific environmental requirements) can provide isolation of potentially contaminated sediments. Aggregate caps (e.g., with a gravel surface) may potentially be appropriate for consideration in sediment areas with high potential for disturbance (e.g., from wind-generated wave forces) or in higher intertidal zones at the Site where the natural habitat is relatively coarse-grained.

Sediment caps would be constructed of clean silt/sand and/or sand and gravel materials and could be placed by a number of mechanical and hydraulic methods. Cap material would either be provided from a beneficial reuse marine dredging project or from a commercial quarry in cases where beneficial reuse material would not provide the appropriate grain size. The grain size requirements would be determined during remedial design based on consideration of erosive forces (e.g., wind/wave) and habitat compatibility, and would likely vary depending on elevation and location. Beneficial reuse of Snohomish River maintenance dredged material or other suitable sediments would be considered during remedial design and is generally preferred over quarried material.

Caps designed according to the EPA and Corps guidance have been demonstrated to be protective of human health and the environment (EPA, 2005). Design specifications for in-situ engineered caps would be further refined during remedial design based on detailed analysis of the following components:

- Bioturbation
- Habitat compatibility
- Erosion (e.g., tidal currents, waves, and wakes)
- Chemical isolation
- Consolidation
- Operational considerations (e.g., placement inaccuracies)

During remedial design, appropriate cap designs for different SMAs would be determined individually for each component based on location-specific design parameters. For the purposes of this FS, a conceptual-level average 2-foot-thick cap design was considered to be applicable across the Site based on a review of engineered caps designed, approved, and successfully constructed and monitored in other areas of Puget Sound, also taking into consideration site-specific habitat conditions. While a 2-foot-thick cap is expected to provide an appropriate representation for the capping technology, actual cap thicknesses developed during remedial design could range from 1 to 3 feet for various areas of the Site depending on area-specific environmental factors such as elevation, habitat, and erosion. While in-situ was not retained as a general response action for the Site, the potential use of a sequestering agent as an amendment in caps for various areas of the Site will be evaluated during design.

Containment may be more appropriate within certain areas of the Site than in others. It is best suited to the following:

- Areas with deeper contamination or where higher concentrations are found at depth and where the risk of recontamination from dredging residuals is higher
- Areas adjacent to steep slopes where removal poses a higher risk and where shoring would likely be required
- Areas where restrictions associated with institutional controls are compatible with future land use, property ownership, and navigation
- Areas with flat or shallow sloping fine-grained substrate where cap material can be placed accurately and will be retained at the sediment surface where placed
- Areas where cap material can be placed in the dry, minimizing water quality impacts

8.2.7 REMOVAL

Removal of sediments from the aquatic environment is a common approach to addressing materials that require remedial action. If selected as a part of the final remedy, tidal mudflat sediments could be excavated under lower tide conditions using low ground-pressure upland-based equipment and mud mats. The use of standard water-based dredging equipment would be limited due to the elevation of tidal mudflat sediment and typical drift requirements for marine dredging equipment. Removal using upland-based equipment was retained as a response action for more detailed evaluation in this FS.

A number of site-specific operational conditions influence the effect of environmental dredging of contaminated sediment on aquatic systems. Experience documented on other sediment cleanup projects shows that resuspension of contaminated sediment and release of contaminants occur during dredging and that contaminated sediment residuals will remain following operations. This can affect the magnitude, distribution, and bioavailability of the contaminants and the exposure and risk to receptors of concern. Dredging residuals have been shown to be particularly problematic at sites with considerable debris (Patmont and Palermo, 2007). Because of the historical use of the Site tidal mudflats for log rafting, considerable subsurface logs and other debris are anticipated to be encountered during removal, complicating the excavation operations. Moreover, even after decades of sediment remediation project experience, there are still substantial uncertainties regarding the risk reduction that can be achieved by removal, particularly for bioaccumulative chemicals such as PCBs and dioxins/furans (e.g., EPA, 2005, Bridges et al., 2008, Bridges et al., 2010).

Where removal is considered, residuals management strategies would need to be considered. Considerable experience from prior removal projects shows that the historical approach of using multiple cleanup passes to address residuals is ineffective. More recently, sediment remedies have incorporated a residuals management strategy that includes placement of a post-removal clean cover. For Site sediment cleanup alternatives that include a removal component, residuals would be managed by backfilling the removal footprint to the existing grade.

For each removal alternative, the horizontal extent of removal was defined either by the boundary of the SMA or sub-area specific to that alternative. The vertical extent of removal was defined based on the results of sediment coring, supplemented as appropriate with the surface sample results. For surface samples where core data are not available, a preliminary removal depth of 2 feet has been incorporated into the volume estimates. Should removal be selected as part of the final remedy, the extent of the removal prisms would be refined by performing additional core sampling during remedial design.

The current sediment FS practice is to “scale up” estimated removal volumes from the preliminary removal prism neatlines summarized above. Based on a review of similar sediment cleanup projects, appropriate scaling factors range from 1.2 to 2 times the neatline estimate of removal volumes, depending on-site understanding at the time of the FS, and the level of engineering that was used in developing the volume estimate. Removal volumes calculated in this FS are based on the horizontal and vertical extents as described above and include a 0.25-foot overdepth allowance on the neatline removal volumes. This volume is then further scaled up by an additional factor of 20% to accommodate potential uncertainty in actual distribution of potential contamination, and considering engineering factors such as side slopes and level cuts that would be implemented during remedial design development, consistent with recent Corps guidance (Palermo et al., 2008).

Removal may be more appropriate within certain areas of the Site than in others. It is best suited to the following:

- Areas where contamination is relatively shallow and where removal could be done in the dry, posing a lower risk of recontamination
- Areas with higher contaminant concentrations
- Areas with flatter adjacent slopes that would not require shoring
- Areas where restrictions associated with institutional controls are compatible with future land use, property ownership, and navigation

8.2.7.1 DISPOSAL OPTIONS

There are several options for disposal of marine sediments removed through excavation. For those sediments that are determined by the DMMP to be suitable for open-water disposal, such sediments may be transloaded onto a barge for transport and disposal at an unconfined open-water disposal site, including the Port Gardner DMMP disposal site. Some of the tidal mudflat sediment areas adjacent to the Knoll Area that contain elevated total PCB concentrations but relatively low dioxin/furan TEQ levels appear to be within DMMP suitability criteria for open-water disposal and could potentially be pursued further during remedial design.

For debris and other sediments that are not suitable for open-water disposal, upland beneficial reuse and/or disposal at a permitted municipal or private landfill (e.g., construction debris landfill or Subtitle D landfill) may be needed for alternatives that include a removal component.

Sediments excavated using land-based equipment could be transloaded from the upland area of the Site onto a barge, and shipped directly to a commercial landfill, or to a barge-truck-rail transloading facility for shipment to a United States landfill with rail access. Alternately, an on-site staging and truck loading area could be set up to process sediments and debris and load this material into trucks for off-site transport and disposal. Where chemistry results allow for potential beneficial reuse, additional alternatives for managing excavated material may be available as discussed below.

8.2.7.2 REUSE OPTIONS

There may be practicable opportunities to reuse some of the excavated materials beneficially, including as backfill for potential upland excavation areas, or as surface fill in other upland areas of the Site (e.g. in the Woodlife Area). As discussed above, some of the tidal mudflat sediments adjacent to the Knoll Area contain total PCB concentrations and dioxin/furan TEQ levels that may be below final upland soil cleanup standards, even for unrestricted use sites. For these materials, there may be opportunities to protectively manage the materials at the Site for beneficial reuse. In this case, debris would need to be screened out prior to reuse, and the geotechnical suitability of the material for reuse addressed to ensure that the reuse is compatible with potential future site uses. For purposes of this FS, on-site beneficial reuse was considered to be a potential component of Site-wide cleanup alternatives; however, a specific volume was not assumed and cost estimates do not include on-site beneficial reuse. This option will be evaluated further during remedial design.

8.2.7.3 EX-SITU TREATMENT

Ex-situ treatment entails additional processing steps that are taken with site sediments after they have been excavated and removed from the marine area. Ex-situ treatment could be used as part of a treatment train to support off-site disposal by adding dewatering reagents to sediments prior to shipment. In this case, ex-situ treatment would not be an independent response action.

Other ex-situ treatment technologies such as thermal desorption and incineration could potentially be applied to Site sediments; however, such technologies are substantially more expensive than off-site landfill disposal, and many of these technologies have limited effectiveness for sediments with a high organic content.

Ex-situ treatment is best suited for scenarios where treatment to reduce contaminant concentrations is needed prior to beneficial reuse or where pre-treatment is needed to meet upland disposal requirements. It is not anticipated that material from any sediment cleanup areas will require pre-treatment prior to upland disposal. While beneficial reuse is considered a potential option for material meeting suitability criteria, ex-situ treatment of PCBs and dioxins/furans to allow for beneficial reuse would not be cost-effective given the relatively small quantity of material that could be disposed of in potential upland excavations. Thus, no ex-situ treatment technologies are retained as independent general response actions. Ex-situ treatment through the addition of dewatering reagents, to the extent that they might be required, is retained for consideration as part of the off-site disposal process.

8.3 SUMMARY OF RETAINED REMEDIATION TECHNOLOGIES

This section summarizes the retained remediation technologies for the uplands and the marine area.

8.3.1 UPLAND SITE AREAS

Table 8.4.1-1 presents the retained remediation technologies for the identified upland assessment areas.

8.3.2 MARINE SEDIMENT AREAS

Exhibit 8.3.2 summarizes the retained remediation technologies for the marine area, including the estimated unit cost (on a per acre or per cubic yard basis) for each technology, based on recent regional project experience.

Exhibit 8.3.2
Retained Marine Area Remediation Technologies

ACTION	ESTIMATED UNIT COST
Institutional Controls	$16,500 See Note 1
Monitored Natural Recovery (MNR)	$22,000/acre
Enhanced Monitored Natural Recovery (EMNR)	$75,000 to $130,000/acre
Engineered Containment	$145,000 to $260,000/acre (technology retained in Feasibility Study, some alternatives in combination with removal)
Removal	$327,000 to $835,000/acre (2-foot-thick removal, disposal, and cap) $50 to $190/cubic yard (removal and disposal)

Notes:

1. The costs for implementing and maintaining institutional controls are highly location- and alternative-specific and would be refined during remedial design.
2. Unit cost range for removal is based on a low-range cost that includes on-site upland beneficial reuse and a high-range cost that includes offsite landfill disposal.
3. Unit costs do not include indirect construction costs (design, permitting, project management, etc.)
4. Unit costs do not include contingency. For FS level costs, a contingency of 30% is typically applied, and has been included in the total cost for the remedial alternatives described in this report.

8.4 DEVELOPMENT OF UPLAND CLEANUP ACTION ALTERNATIVES

Cleanup action alternatives were developed and evaluated based on the requirements and the criteria specified in WAC 173-340-360, Selection of Cleanup Actions and WAC 173-340-370, Expectations for Cleanup Action Alternatives. This section summarizes the remedial alternatives for each selected area that were developed and evaluated for the Site. For each alternative, the key components are described. Components and unit pricing were developed based on prior experience and current vendor information, as available. These data were used to develop conceptual scenarios and to estimate costs associated with each of the listed alternatives.

All proposed cleanup action alternatives include provisions for compliance monitoring that will meet the requirements identified in WAC 173-340-410 including protection of human health and the environment; performance of the cleanup action; and conformational monitoring. A final compliance monitoring program will be included as part of the CAP. Where appropriate, specific monitoring requirements are included as part of the cleanup action alternative.

8.4.1 CREOSOTE AREA REMEDIAL ACTION ALTERNATIVES

The following alternatives have been assembled to address the Creosote Area including on- and off- property impacts to soil, soil vapor, and groundwater to approximately 15 feet bgs, and deeper soil and groundwater. A summary table listing each alternative and the specific technology that is being used to address the different areas of impacts is included as Table 8.4.1-1.

8.4.1.1 ALTERNATIVE 1: SUB-SLAB DEPRESSURIZATION, ENGINEERING CONTROLS, AND INSTITUTIONAL CONTROLS (SSD, EC, & IC)

Deleted: SD

Alternative 1 consists of on-property SSD, engineering controls (establishing surface capping on unpaved portions of the on-property area and the maintenance of all existing surface capping), long-term monitoring of groundwater, and institutional controls.

The purpose of the SSD would be to limit the potential for migration of volatile and semi-volatile compounds from soil and groundwater to indoor air of the existing main manufacturing building via vapor intrusion. SSD would be accomplished for on-property impacts by installing several suction pits within the building. The exact number of pits and their spacing would be determined based on the results of pilot testing but the corresponding cost estimate for Alternative 1 assumed four. These pits would be approximately 2 feet square and 2 feet deep. A 3-inch PVC pipe will be installed to withdraw vapors from the pit. The piping will be run along existing columns to a common header that exits through a building wall to a blower system. Activated carbon treatment of the SSD system effluent would be installed, if required. Sub-slab vapor monitoring points would be installed around the suction pits to confirm that a vacuum compared to building pressure is being maintained under the building.

The purpose of the engineering controls (surface capping) would be to limit groundwater infiltration as well as to create a barrier to the direct exposure pathway. A portion of the contaminated area is currently covered by existing building slabs and surface pavements. An approximately 6,000 square foot unpaved landscaped area is located along the southeast side of the main warehouse adjacent to West Marine View Drive. After installing appropriate erosion control measures, surface capping activities would begin with the excavation and on-site stockpiling of approximately two feet of clean overburden in currently unpaved areas (approximately 450 cubic yards). Under this alternative, a colored polyurethane liner would be installed throughout the excavated area at two feet bgs. The stockpiled soil would be placed atop the polyurethane liner and compacted. Additional clean backfill material would be imported, as necessary. Imported material, if necessary, would be analytically tested prior to placement. The soil cover would be seeded with native grasses. The integrity of the existing building slabs and surface pavements would be inspected on an annual basis for 20 years, and repairs would be completed as necessary to provide contiguous surface capping throughout the area.

The purpose of the long-term monitoring would be to confirm the stability and natural attenuation of the existing groundwater contamination over the course of an estimated 20 years to confirm stability of the groundwater plume. After completion of the surface capping activities, an estimated five groundwater monitoring wells would be installed to monitor the subsurface conditions of the contaminated area. In addition, five existing monitoring wells would be monitored and sampled on a quarterly basis from year one to year five and on an annual basis from year six to year 20. After year 20, the groundwater monitoring wells would be decommissioned, pending the analysis of groundwater samples confirming a stable or shrinking groundwater plume.

Commented [AM(17]: It is unlikely any cleanup levels will be met in 20 years. Ground water monitoring well cannot be decommissioned until cleanup levels are met. Perpetual groundwater monitoring will continue under this alternative. Adjust language.

Institutional controls including a deed restriction would be placed on the property to restrict the types of future development. A soil management plan would be developed to control potential exposure risks posed by direct exposure to subsurface contamination and to protect the integrity of the remedy.

8.4.1.2 ALTERNATIVE 2: IN-SITU BIOREMEDIATION, SUB-SLAB DEPRESSURIZATION, MONITORED NATURAL ATTENUATION, ENGINEERING CONTROLS, AND INSTITUTIONAL CONTROLS (ISB, SSD, MNA, EC, & IC)

Deleted: AND

Commented [AM(18]: It seems MNA will be necessary for this alternative.

Alternative 2 includes installation and operation of a hybrid bioremediation system on- and off-property, engineering controls (establishing surface capping on unpaved portions of the on-property area and the maintenance of all existing surface capping), and short-term institutional controls (see Figure 8.4.1.1-A).

The enhanced Bio system will be installed both on- and off-property to address soil and groundwater impacts to a depth of approximately 50 feet bgs (deep zone treatment at select areas). Prior to installing the system, approximately 10 monitoring wells and 20 temporary Geoprobe points will be completed to further refine the final system size and treatment interval (Figure 8.4.1.1-a). It is expected that some of these wells will be used for performance monitoring of the system. Pilot testing of the Bio system will be performed on-property to determine injection and extraction rates, the rate of nutrient consumption, the performance of vertical recirculation wells, and the performance of deep air injection wells. This data will be used to finalize the design parameters for the system.

The Bio system will consist of several components as follows: 1) a series of recirculation wells (horizontal and vertical) for injection of the nitrate/nutrient/surfactant (NNS) solution; 2) a conveyance system for the recirculation system; 3) a water treatment and chemical addition system; 4) a series of wells to inject air in the shallow and deep zones; 5) an air collection system to capture the injected air; and 6) compressors and blowers to operate the air injection system. These components are described in the following paragraphs.

The NNS injection system will consist of a series of wells throughout the shallow impacted area to a depth of approximately 15 feet spaced approximately 100 feet on center. Approximately half of the wells would be operated as extraction wells and the other half would function as injection points. All the wells constructed for this system would have sumps to collect and recover any DNAPL that might accumulate during treatment. The screen pack for treatment wells will be designed to be as coarse as possible to facilitate the collection of DNAPL and to minimize losses during extraction or injection. Wells located off-property would be installed just west of the railroad as shown on Figure 8.4.1.1-A. Deeper impacts would be addressed through vertical recirculation wells. Three vertical recirculation wells would be located on-property and two would be located off-property as shown on Figure 8.4.1.1-A. These wells would extract groundwater from the deeper zone from 45 to 50 feet, pump it to the NNS addition system and the NNS treated water would be reinjected at a depth of 15 to 20 feet.

Commented [AM(19]: Treated water has a different connotation. Use "NNS treated" instead.

Treatment wells would be connected to two sets of PVC or HDPE piping – injection and extraction – so that each well could be configured to run as an injection or extraction well. Perforated piping to capture injected air would also be installed in the same trench.

Groundwater will be pumped from the extraction points by submersible pumps and conveyed to the NNS addition system at a total rate of approximately 60 gpm (actual pumping rate to be obtained during pilot testing). The system would consist of an influent settling tank to allow for settling of solids and separation of product, followed by a nitrate/nutrient addition tank. Nitrate, other nutrients, and surfactants would be added to the addition mix tank. After the nitrate addition the water would be pumped through sand filters to remove any undissolved materials prior to injection. The filtered water would then be directed to the various wells in the injection field. It is expected that the NNS solution will only be added periodically, but the recirculation will continue without NNS additions to enhance the contact of the NNS solution and injected air within the formation.

Commented [AM(20]: Given the site's location to marine environment which is N limited, it is preferable to use sulfate. We understand, nitrate is preferred electron acceptor when compared with sulfate and denitrification can occur in anoxic environment (+50 to -50 mV ORP). Therefore, there will be monitoring of nitrate in downstream MWs to make sure it is not migrating from treatment area.

Air injection will be performed through a series of 1-inch diameter wells installed on a roughly 80 foot spacing over the area of shallow impacts. The deep zone would be addressed by the installation of 6 deep wells on-property and 4 deep wells off-property as shown on Figure 8.4.1.1-a. Injected air will be recovered by a series of perforated pipes installed in the trenches containing the NNS and air injection piping. The air recovery system on property will also function to mitigate vapors that could migrate into the building. The compressors, blowers, and emission controls for the air injection system will be installed in the same compound as the NNS system.

The system will initially be operated similarly to an AS/SVE system that will focus on removal of more volatile hydrocarbons. When the concentration of hydrocarbons in the extracted vapor begins to significantly decrease (which is expected in the first six months of operation), the NNS will begin operation. The air injection system will continue to operate, but it is expected that over time the system would run in a pulsed mode, assisting with in-situ groundwater mixing. Two NNS injection events are anticipated – one near the end of the first year of AS/SVE operation and the second after nitrate is no longer detected in the extracted groundwater, which is expected to occur two years after the first injection. However, recirculation using the NNS system will continue between chemical additions.

It is estimated that the bioremediation system would be in operation for approximately 5 years based on results of groundwater monitoring. Performance monitoring will be completed semi-

Commented [AM(21]: At what level of COCs, we would say ISB is complete and successful. Transition to MNA. Establish a remediation level (REL) for IHS before ISB can shut down and MNA can take place through demonstration. REL as 5X cleanup level is a good start. However, it needs to conform to the cleanup technology.

annually during operation of the system at approximately 4 downgradient locations and 6 locations within the plume. After decommissioning the Bio system, 10 wells will be monitored annually for five years to confirm that any residual impacts remaining are stable or decreasing in concentration.

Commented [AM(22]: Does this mean, CUL will be reached in 5 years after biological treatment?

Commented [AM(23]: This is not an acceptable condition for MNA. You need to demonstrate MNA is working through three lines of evidence per EPA guidance (2008).

The air recovery component of the Bio system on-property will serve as an SSD system for the existing main manufacturing building. Pilot testing for an SSD system will be conducted to ensure the Bio air recovery configuration and specifications adequately abate the potential vapor intrusion pathway.

Engineering controls (surface capping) will be completed as described for Alternative 1.

Short-term institutional controls, including development of a soil management plan, will be completed as described for Alternative 1.

8.4.1.3 ALTERNATIVE 3: IN-SITU CHEMICAL OXIDATION, SUB-SLAB DEPRESSURIZATION, MONITORED NATURAL ATTENUATION, ENGINEERING CONTROLS, AND INSTITUTIONAL CONTROLS (ISCO, SSD, MNA, EC & IC)

Commented [AM(24]: Will this alternative rely on MNA?

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Alternative 3 includes ISCO on-property, engineering controls (establishing surface capping on unpaved portions of the on-property area and the maintenance of all existing surface capping), and short-term institutional controls (Figure 8.4.1.1-B).

The ISCO program will be performed on-property to address the concentrations of volatile and semi-volatile contaminants to a depth of up to 50 feet. Prior to beginning the program approximately 10 monitoring wells and 30 temporary Geoprobe points will be installed to further refine the lateral extents and the target depth interval for treatment (Figure 8.4.1.1-B). It is expected that some of these wells will be used for performance monitoring of the system. Pilot testing of ISCO would be performed by injecting in four locations. Three monitoring wells within the expected influence of the injections will also be installed. Samples from the monitoring wells before and after injections will be compared to estimate the destruction of hydrocarbons in the subsurface.

Commented [AM(25]: What would be a typical performance criterion? Again, need to establish REL for IHS. REL as 5X cleanup level is a good start. However, it needs to conform to the cleanup technology.

ISCO will be used to target the soils to a maximum depth of 50 feet on-property. The purpose of the on-property injections would also be to treat groundwater above PCLs with creosote/TPH impacts in-situ. The injected material would consist of sodium persulfate with water. Three injection events would be performed, approximately 6 months apart (2 years of treatment). Injection events will consist of utilizing a direct push drilling rig with specialized injection tooling to deliver the solution to the subsurface. Injection activities would necessitate a water supply, either from a nearby hydrant (pending permitting requirements) or a water-supply truck. Water and the solution will be mixed on-site prior to injecting at pre-determined injection rates based on the findings of the pilot test.

Performance monitoring will be performed 2 and 4 months after each injection event to evaluate treatment performance and identify areas that require additional injections. Soil performance monitoring and one year of quarterly performance groundwater monitoring will be performed at 10 locations following the final injection event. Compliance monitoring will be performed semiannually for 3 years and annually for 1 year following the last injection event to document that residual impacts are stable or decreasing.

ISCO is not proposed for addressing the off-property impacts because the required spacing of the injection points is estimated to be limited to 6 to 10 feet. Performing ISCO in the West Marine View Drive right of way and near many utilities would result in multiple closures of the road as well as potential damage to the road bedding and/or utilities by the injection of treatment solutions. The marsh on the eastern side precluded access for injection of treatment solution due to the soft ground and standing water. The marsh also posed additional risk releasing treatment solution to surface water through surface fracturing. Therefore, injections off-property were not considered technically practicable.

Commented [AM(26]: Is there any other options should be used for off property soils?

Commented [AM(27]: Technically, this alternative should be thrown out if it does not address off property areas. “Not addressing contamination in off property areas” fails to meet MTCA threshold and minimum requirement.

An SSD system will be pilot tested and installed as described in Alternative 1.

Engineering controls (surface capping) will be completed as described in Alternative 1.

Short-term institutional controls will be completed as described in Alternative 2.

8.4.1.4 ALTERNATIVE 4: SOIL REMOVAL, IN-SITU BIOREMEDIATION, MONITORED NATURAL ATTENUATION, AND INSTITUTIONAL CONTROLS (SR, ISB, MNA, IC)

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Alternative 4 includes mass excavation and off-site disposal of contaminated soil on-property to 15 feet bgs, bioremediation treatment for deeper on-site groundwater and shallow and deeper off-site groundwater, and short-term institutional controls (Figure 8.4.1.1-C).

To better determine the required extent of the excavation and to collect soil samples for geotechnical testing a series of 10 monitoring wells and 30 temporary Geoprobe points would be installed. This information will be used to locate and design shoring necessary for the excavation of impacted soils to a depth of 15 feet.

Excavation of contaminated soil would be removed to a maximum depth of 15 feet bgs. Due to the shallow groundwater and potential for flowing sands excavation would require shoring by sheet pile or a reinforced bentonite concrete wall to protect structures, roadways, and utilities. The excavation will proceed by sections, with shorter sections along the wall being excavated first. The wall would be braced during this phase until clean soil is backfilled and compacted behind the wall. Once the wall has been braced with clean backfill, interior cells can then be excavated.

This will require that a signification portion of the existing main manufacturing building be demolished and rebuilt after the excavation. Demolition of the building will require the potential abatement of ACM and/or lead based paint. It is expected that the shoring method (sheet pile or wall) will reduce the amount of water that must be pumped to capture groundwater in the excavation. Enough data does not exist at this point to design water handling systems, but it is assumed for cost estimating in this report that the system will operate at approximately 100 gpm to control water in the excavation. The extents of the excavation would be based on existing analytical data supplemented with additional investigation described above. The approximate extent of the excavation is shown on Figure 8.4.1.1-C.

Commented [AM(28]: Rebuilt is not eligible remedial action cost and needs to be removed from cost consideration.

Commented [AM(29]: This seems overly conservative. With sheet pile wall shoring there will be less groundwater flow. With 100 gpm you can pump more than 1 acre-ft of water per day which is unlikely to be produced at the site.

It is assumed that 80% of the soil to a depth of 5 feet would be clean overburden. Separating clean from impacted soils during the excavation of the saturated zone would be difficult without groundwater depression. For this report cost estimate it is assumed that 20% of the saturated soils could contain product and be considered a Persistent Waste increasing handling and disposal costs.

Commented [AM(30]: Form boring logs and groundwater elevation data, it seems water table is below 5 ft. There is no need for groundwater depression. Clean unsaturated soil can be stockpiled at a separate location and can be used to backfill by segment.

Commented [AM(31]: It seems this is unnecessary as it increases the cost of this alternative disproportionately. If areas of pooled NAPL present, that volume could be pretreated before disposal. SLR contends in other areas there is no contiguous NAPL present in the site.

The excavation would be backfilled with clean stockpiled overburden and imported granular fill. The soil will be placed and compacted to allow for the reconstruction of the building. Due to the prolonged disruption and required closures that would be necessary, excavation would not include soil beneath West Marine View Drive or BNSF property. Excavation of contaminated soil is estimated to take up to a year, including building demolition, shoring installation and testing following the removal activities.

Commented [AM(32]: Ecology does not believe this will take a year. The excavation of 10000 tons of soil can typically be done in one month. In addition, due to nature of stratigraphy (sand and loose material and no big gravel or rocks), excavation will be easy and fast.

Performance groundwater monitoring would be performed semiannually for 5 years at 10 wells and annually for 5 years to evaluate reductions in concentrations in groundwater.

On-property impacts deeper than 15 feet and off-property impacts will be addressed through a Bio system as described in Alternative 2, and as applicable.

Short-term institutional controls will be completed as described in Alternative 2.

8.4.1.5 ALTERNATIVE 5: THERMAL TREATMENT, SUB-SLAB DEPRESSURIZATION, MONITORED NATURAL ATTENUATION, ENGINEERING CONTROLS, AND INSTITUTIONAL CONTROLS (TT, SSD, MNA, EC, IC)

Commented [AM(33]: Is MNA necessary for this Alternative?

Alternative 5 includes thermal treatment (TT) using steam enhanced extraction (SEE) targeting on-property and off-property soil and groundwater (shallow and deep), and a temporary SSD system, engineering controls, and short-term institutional controls to be employed during SEE activities (Figure 8.4.1.1-D).

Prior to the installation of a TT system a series of 30 temporary Geoprobe points will be installed to better define the extent of impacts. Samples of impacted soils would also be collected for bench testing for TT. TT will focus on areas that are heavily impacted or contain DNAPL.

TT involves heating the subsurface to volatilize contaminants or liquify heavier constituents to a more mobile state so that they can be recovered though multi-phase extraction points. The heating can be achieved through different methods such as electrical resistance heating, thermal conductive heating, or steam enhanced extraction (SEE). At this site, the contaminants and sandy soils are most amenable to SEE.

The use of SEE will require the installation of a steam plant and liquid and vapor treatment equipment at the Site. In addition, existing monitoring wells, abandoned borings, or potential utility access points within the treatment area will have to be abandoned with heat resistant concrete as the heat will damage PVC wells and steam could escape through the well. Utilities that are buried shallower than five feet may not be affected by SEE but will need to be evaluated for protection measures. Deeper utilities may require relocation or the design of the SSE wells may have to be adjusted to avoid damage to critical utilities. SEE should not require the demolition of the building and can be performed in the roadway with partial temporary closures. Because of safety concerns the sidewalks in the treatment area may need be closed during the duration of treatment activities.

SEE is typically performed using a series of steam injection wells that are installed around a central extraction point. The wells will be screened to address impacts at certain depths. Multiple wells, at different depths, will be needed to treat the soils from 5 to 50 feet bgs. Steam is injected around the periphery wells which forces contaminants in vapor and liquid form to migrate to the extraction point. At higher temperatures creosote can become less dense to the point where it will float in the groundwater. The vapors and liquids are conveyed to the treatment systems where they are cooled, liquids separated into water and product, and the vapor and water are further treated and discharged.

During SEE, monitoring of the soil temperature, energy input, and the amount of hydrocarbons being extracted are the key variables used to determine the progress of the remediation of a cell. Initially, “hot” soil samples will be collected to confirm that monitoring the system parameters were correctly predicting remediation of the cell. Thereafter, these parameters will be used as the primary indicators that remediation has been completed in a cell. A final round of confirmatory sampling will be performed shortly before the SEE work is complete and the contractor demobilizes. A total of approximately 50 locations will be sampled to confirm the remediation of the Site.

The SEE is expected to require 12 months to design and permitting, 3 months to construct, and will operate for approximately 6 months. After completion of the project and the soil has cooled, 10 new monitoring wells will be installed for performance monitoring. These wells will be sampled semi-annually for 2 years to verify the performance of the SEE.

Commented [AM(34]: Will cleanup levels be reached after treatment? If not, establish REL and mention MNA as next step.

To address potential concerns related to vapor intrusion and direct contact, a temporary SSD system, engineering controls, and short-term institutional controls (as described in Alternative 3) will be in-place during the duration of SEE activities.

8.4.1.6 ALTERNATIVE 6: IN-SITU SOIL STABILIZATION/SOLIDIFICATION, THERMAL TREATMENT, AND INSTITUTIONAL CONTROLS (ISS, TT, IC)

Commented [AM(35]: Is MNA necessary?

Deleted: And

Alternative 6 includes In-Situ Soil Stabilization/Solidification (ISS) targeting on-property impacts, TT (via SEE) targeting off-property impacts, and short-term institutional controls (Figure 8.4.1.1-E).

Prior to the installation of a TT system and performing ISS, a series of 30 temporary Geoprobe points will be installed to better define the extent of impacts both on- and off-property. Samples of impacted soils would also be collected for bench testing for TT and ISS. Both TT and ISS will focus on areas that are heavily impacted or contain DNAPL.

ISS will be performed by using a large diameter auger/paddle rig to inject cement or other amendments into soil while mixing with the auger/paddle rig. The permeability of the soil “column” is greatly reduced and the contaminants are bound into the soil with the amendments effectively becoming insoluble. To determine the best amendment for the product at the Site, soil samples with product will be collected for bench scale pilot testing.

Large diameter augers, from 4 to 12 feet in diameter would be used to inject the amendments and mix the soil. The exact diameter depends on soil type and depth of impacts, with smaller augers generally being used for deeper impacts. Demolition of the building will be required for the large cranes and augers to be able to access the target area (as described in Alternative 3). A mix plant will be assembled on the Site to store and prepare the large volumes of amendment that will be injected into the soil.

TT will be performed on the off-property areas as described in Alternative 5, as applicable. It is assumed that the ISS and TT work can proceed independently of each other, although some coordination will be required at the transition areas between ISS and TT.

After the completion of ISS and TT new wells will be installed for performance verification. For the ISS area four wells (two shallow and two deep) will be installed near both the upgradient and downgradient edge of the ISS area. Four wells (two shallow and two deep) will also be installed on the east side of West Marine View Drive to monitor the upgradient area of the TT area. These wells will be monitored semi-annually for 2 years after the completion of the work to document the performance of the remediation.

8.4.1.7 ALTERNATIVE 7: HOTSPOT SOIL REMOVAL, IN-SITU BIOREMEDIATION, MONITORED NATURAL ATTENUATION, AND INSTITUTIONAL CONTROLS (HSR, ISB, MNA, IC)

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8.4.2 WOODLIFE AREA REMEDIAL ACTION ALTERNATIVES

The following alternatives have been assembled to address the Woodlife Area including on property impacts to soil and the associated impacts to groundwater.

8.4.2.1 ALTERNATIVE 1: ENGINEERING CONTROLS, INSTITUTIONAL CONTROLS AND LONG-TERM MONITORING

Alternative 1 for the Woodlife Area consists of engineering controls (maintaining the existing surface caps), installing additional monitoring wells for long-term monitoring, and institutional controls (see Figure 8.4.2.1-A).

The purpose of the surface capping would be to limit groundwater infiltration as well as to create a barrier to the direct exposure pathway. The majority of the Woodlife Area is currently covered by existing building slabs and surface pavements with the exception of a small landscaped area adjacent to the NTD.

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Four additional groundwater monitoring wells will be installed as part of the long-term monitoring. These monitoring wells will be installed around the perimeter of the impacts identified during RI activities focused on the Woodlife Area.

Performance monitoring for Alternative 1 includes semiannual monitoring at 6 shallow monitoring wells (existing monitoring wells MW-6 and MW-7, and four newly installed monitoring wells) for 5 years; and annual monitoring for 15 years after completion of surface capping to confirm the stability and natural attenuation of the remaining groundwater contamination. In addition, annual surface capping inspections will be performed, likely in conjunction with the scheduled groundwater monitoring events. Compromised integrity of the surface capping will be documented and repaired as needed.

After year 20, the groundwater monitoring wells would be decommissioned, pending the analysis of groundwater samples confirming a stable or shrinking groundwater plume.

Commented [AM(36]: Groundwater monitoring well cannot be decommissioned until cleanup levels are met. This alternative will not result in meeting ground water cleanup levels in 20 years and perpetual monitoring will continue. Adjust the text.

Institutional controls will include recording an environmental covenant to restrict the future development activities in the Woodlife Area to prevent potential exposure to contaminated media.

8.4.2.2 ALTERNATIVE 2: SOIL REMOVAL

Alternative 2 for the Woodlife Area includes soil excavation followed by MNA, engineering controls (re-establishing the existing surface caps) and institutional controls (see Figure 8.4.2.1-B).

The purpose of the on-site soil excavation for the Woodlife Area would be to remove the impacted soil for off-site disposal.

After installing appropriate erosion control measures, approximately 22,000 square feet of the existing asphalt pavement and concrete surfaces (interior and exterior of existing building) would be removed. A portion of the existing main manufacturing building will need to be supported in anticipation of excavation activities that extend within the footprint of the building. Impacted soil from approximately 0 to 5 feet bgs would be excavated and hauled to an appropriate off-site disposal facility as special waste. Approximately 5,500 tons of soil would be excavated. The use of dewatering equipment (Banker tanks, pumps, etc.) would likely be needed as the excavation would extend into the shallow groundwater table. The water would be treated on-site with bag filters and activated carbon before being discharged to the city sanitary sewer (pending a permit). Clean backfill would be imported and placed into the excavation. Imported material would be analytically tested prior to placement. The backfill would be compacted and the excavation area would be finished with an estimated three inches of asphalt surface capping to match the existing surface capping to ensure contiguous surface capping throughout the contaminated area.

Dioxins primarily adhere to soil and would be removed during the soil excavation. Performance soil samples will be collected from the excavation extents and bottom to document removal of contaminated soil. Performance groundwater monitoring would be performed quarterly for one year following soil removal to evaluate reductions in COC concentrations in groundwater followed by annual compliance monitoring events for an estimated 5 years to confirm cleanup action completion. Institutional controls would be implemented as detailed in Alternative 1 during this period of post removal monitoring.

Commented [AM(37]: What is the level performance sampling will be compared to? Establish a REL for D/F. Ecology proposes a value of 5X CUL.

8.4.3 AREA 3 (KNOLL FILL AREA) REMEDIAL ACTION ALTERNATIVES

Alternatives to address the Knoll Fill Area including impacts to groundwater and potential transport to near-shore sediments were considered; however, due to identified contaminated media and potential transport pathways, remedial action for the Knoll Fill Area contamination is included as part of Marine cleanup action alternatives (Section 8.5)

8.5 DEVELOPMENT OF MARINE CLEANUP ACTION ALTERNATIVES

Under MTCA and SMS, sediment cleanup alternatives are evaluated on the basis of the requirements and the criteria specified in WAC 173-204-570. This section summarizes the nine remedial alternatives that were developed and evaluated for the sediments portion of the Site. The following are included as components of each of the nine alternatives:

- Removal and disposal of piling and creosote-treated wood debris
- Demolition and disposal of two shoreline bulkheads and a remnant barge structure
- Shoreline erosion protection along the top of the bank adjacent to SMA 3

Key components for each individual alternative are described in the sections below. Components and unit pricing were developed based on prior experience and current vendor information. These data were used to develop conceptual-level designs for each alternative, and to estimate costs associated with each alternative. The nine sediment cleanup alternatives evaluated in this FS include:

- Alternative M1: Source Control and Natural Recovery
- Alternative M2: Capping Focus (armored shoreline)
- Alternative M3: Capping Focus (soft shoreline)
- Alternative M4a: Targeted Removal Focus – North Inlet Area (2-foot removal)
- Alternative M4b: Targeted Removal Focus – North Inlet Area (4-foot removal)
- Alternative M5: Targeted Removal Focus – Southern Areas
- Alternative M6: Removal Focus
- Alternative M7: Full Removal Focus
- Alternative M8: Full Removal

Exhibit 8.5 provides a summary of the components of each of the marine area alternatives as they relate to the specific SMAs described in Section 7.

Exhibit 8.5
Summary of Marine Area Alternatives

ALTERNATIVE NUMBER	DESCRIPTION	ACTION FOR EACH AREA		
		SMA 1	SMA 2	SMA 3
M1	Source Control and Natural Recovery	MNR	MNR	MNR
M2	Capping Focus (armored shoreline)	MNR	EMNR (6- to 12-inch Cover)	Engineered cap-on-grade (2-foot thickness) riprap shoreline
M3	Capping Focus (soft shoreline)	MNR	EMNR (6- to 12-inch Cover)	Engineered cap-on-grade (2-foot thickness) with overlying lift to reduce need for armor creating a softer shoreline
M4a	Targeted Removal Focus – North Inlet Area[a,b]	MNR	EMNR (6- to 12-inch Cover)	Engineered cap-on-grade (2-foot thickness) and 2-foot removal and cap (inlet area)
M4b	Targeted Removal Focus – North Inlet Area[a,b]	MNR	EMNR	Engineered cap-on-grade (2-foot thickness) and 4-foot removal and cap (inlet area)
M5	Targeted Removal Focus- South Areas[a]	MNR	EMNR (6- to 12-inch Cover)	Engineered cap-on-grade (2-foot thickness) and 2-foot removal and cap (southern areas)
M6	Removal Focus	MNR	EMNR (6- to 12-inch Cover)	Removal of top 2 feet and engineered cap
M7	Full Removal Focus	MNR	EMNR (6- to 12-inch Cover)	Removal to clean and backfill
M8	Full Removal	Removal to Clean and Backfill	Removal to Clean and Backfill	Removal to clean and backfill

Notes:
EMNR = enhanced monitored natural recovery

MNR = monitored natural recovery
SMA = sediment management area
[a] Post-dredging actions are assigned on a sub-SMA basis.
[b] Inlet grades may change as a result of remedial action as required for geotechnical stability.

8.5.1 MARINE ALTERNATIVE 1: NATURAL RECOVERY

As discussed in Section 8.2.3, the sediment dioxin/furan concentrations that exceed cleanup levels are due to historical legacy releases and the potential upland cleanup areas are not considered a potential source for future recontamination of the Site tidal mudflats. The potential upland cleanup technologies are described in Section 8.1.

Marine Alternative 1 (Alternative M1) consists of shoreline protection and piling and structure removal described in Section 8.5, along with MNR of approximately 16.6 acres of surface sediments in SMAs 1, 2, and 3. The MNR alternative would include long-term sediment sampling to measure concentrations of total PCBs and dioxin/furan TEQ within the biologically active zone (surface to 1 foot below mudline). Typical sampling schedules at other MNR sites in Puget Sound include sampling and analysis at years 2, 5, 10, 15, 20, and 30 following construction of the shoreline stabilization action. The details of MNR sampling, including sample station locations, analytes, and sampling schedule would be determined by Ecology during development of the draft CAP. Shoreline protection would consist of appropriately sized riprap armor and filter layers on the upper, steepened, portions of the shoreline adjacent to SMA 3.

The construction duration of Alternative M1 is estimated to be 1 to 2 months. Figure 8.5-1 depicts a plan view of Alternative M1.

8.5.2 MARINE ALTERNATIVE 2: CAPPING FOCUS (ARMORED SHORELINE)

In addition to the shoreline protection and piling and structure removal described in Section 8.5; Marine Alternative M2 consists of the following major elements:

- Monitor the natural recovery of approximately 8.2 acres of surface sediments in SMA 1
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap-on-grade over sediments as follows:
    - Procure an estimated 17,680 tons of material from a commercial upland source.
    - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the physical integrity of the engineered cap upon completion of construction.

Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods. As with the MNR described in Alternative M1, long-term monitoring under this alternative would include periodic post-construction sampling and testing of sediments within the biologically active zone to verify that cleanup standards are met and continue to be met. The scope and details of the long-term monitoring would be determined during development of the draft CAP and may be refined as part of remedial design.

The estimated construction duration of Alternative M2 is a single in-water work season (approximately 3 to 4 months).

Figure 8.5-2 depicts a plan view of Alternative M2.

8.5.3 MARINE ALTERNATIVE 3: CAPPING FOCUS (SOFT SHORELINE PROTECTION)

In addition to the piling and structure removal described in Section 8.5; Marine Alternative M3 consists of the following major elements:

- Soft-armoring the shoreline adjacent to SMA 3 by creating a bench to flatten the slope and allow for elevations and smaller grain-size material that would support salt marsh vegetation.
- Monitor the natural recovery of approximately 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap-on-grade over sediments as follows:
    - Procure an estimated 17,680 tons of material from a commercial upland source.
    - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the physical integrity of the engineered cap upon completion of construction.

Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods. As with the MNR described in Alternative M1, long-term monitoring under this alternative would include periodic post-construction sampling and testing of sediments within the biologically active zone to verify that cleanup standards are met and continue to be met. The scope and details of the long-term monitoring would be determined during development of the draft CAP and may be refined as part of remedial design.

The estimated construction duration of Alternative M3 is a single in-water work season (approximately 4 to 5 months).

Figure 8.5-3 depicts a plan view of Alternative M3.

8.5.4 MARINE ALTERNATIVE 4A: TARGETED REMOVAL FOCUS – INLET AREA

In addition to the shoreline protection and piling and structure removal described in Section 8.5; Marine Alternative M4a would consist of the following major elements:

- Monitor the natural recovery of 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap-on-grade over sediments as follows:
    - Procure an estimated 17,680 tons of material from a commercial upland source.
    - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the physical integrity of the engineered cap upon completion of construction.
- Excavate sediments in the north inlet area (top 2 feet) as follows:
    - Remove up to approximately 2,047 cubic yards of sediments from the top 2 feet of 0.47 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Excavation in the north inlet area may also require shoring to protect the adjacent upland area where an access road and underground utilities are located at the top of the slope.
    - Removal volumes include an assumed overdepth allowance of 0.25 feet, and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design, as well as potential buried debris that may result in additional removal volumes.
    - Remove any temporary shoring used to protect the slope adjacent to the upland side of the excavation.
- Manage excavated material as follows:
    - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
    - Treat water generated from temporary stockpiles for discharge as required by permits.

    - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
    - Excavations would be 2-foot thickness, matching the engineered cap thickness. No backfill would be required to match the post-excavation grades once excavated areas are capped.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Excavation residuals would be managed by capping excavated areas. Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods.

Engineered cap-on-grade monitoring and maintenance would be conducted in accordance with an approved, long-term, operations, monitoring and maintenance (OMM) plan, which would be developed as part of remedial design. Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative would span one in-water construction season (approximately 4 to 5 months).

Figure 8.5-4 depicts a plan view of Alternative M4a.

8.5.5 MARINE ALTERNATIVE 4B: TARGETED REMOVAL FOCUS – INLET AREA

In addition to the shoreline protection and piling and structure removal described in Section 8.5; Marine Alternative M4b would consist of the following major elements:

- Monitor the natural recovery of 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap-on-grade over sediments as follows:
    - Procure an estimated 17,680 tons of material from a commercial upland source.
    - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the physical integrity of the engineered cap upon completion of construction.
- Excavate sediments (top 4 feet) in the inlet area as follows:
    - Remove up to approximately 3,866 cubic yards of sediments from the top 4 feet of 0.47 acre in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.

  - Excavation in the north inlet area will also require shoring to protect the adjacent upland area where an access road and underground utilities are located at the top of the slope.
  - Removal volumes include an assumed overdepth allowance of 0.25 feet and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design.
- Manage excavated material as follows:
  - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
  - Treat water generated from temporary stockpiles for discharge as required by permits.
  - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
  - Excavations would be 4-foot thickness, matching the engineered cap thickness. Partial backfill would be required to match the post-excavation grades once excavated areas are capped.
- Backfill sediments in the inlet excavation footprint:
  - Procure an estimated 1,933 cubic yards of material from a beneficial use and/or commercial source.
  - Place backfill over the removal footprint using land-based low ground pressure equipment and placement methods as appropriate to bring grades in the excavation footprint to within 2 feet of the original mudline and allow for the 2-foot cap to be constructed over the backfill to match the original grades.
  - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Excavation residuals would be managed by capping excavated areas. Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods.

Engineered cap-on-grade monitoring and maintenance would be conducted in accordance with an approved, long-term OMM plan, which would be developed as part of remedial design. Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative would span one in-water construction season (approximately 5 months).

Figure 8.5-5 depicts a plan view of Alternative M4b.

8.5.6 MARINE ALTERNATIVE 5: TARGET REMOVAL FOCUS – SOUTH SHORE LINE

In addition to the shoreline protection, piling and structure removal described in Section 8.5, Marine Alternative M5 would consist of the following major elements:

- Monitor the natural recovery of 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap-on-grade over sediments as follows:
    - Procure an estimated 17,680 tons of material from a commercial upland source.
    - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Monitor the physical integrity of the engineered cap upon completion of construction.
- Excavate sediments (top 2 feet) in the south shoreline area as follows:
    - Remove up to approximately 10,682 cubic yards of sediments from the top 2 feet of 2.45 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Removal volumes include an assumed overdepth allowance of 0.25 feet and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design.
- Manage excavated material as follows:
    - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
    - Treat water generated from temporary stockpiles for discharge as required by permits.
    - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
    - Excavations would be 2-foot thickness, matching the engineered cap thickness. No backfill would be required to match the post-excavation grades once excavated areas are capped.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Excavation residuals would be managed by capping excavated areas. Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods.

Engineered cap-on-grade monitoring and maintenance would be conducted in accordance with an approved, long-term OMM plan, which would be developed as part of remedial design. Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative would span one in-water construction season (approximately 5 months).

Figure 8.5-6 depicts a plan view of Alternative M5.

8.5.7 MARINE ALTERNATIVE 6: REMOVAL FOCUS

In addition to the shoreline protection and piling and structure removal described in Section 8.5, Marine Alternative M6 would consist of the following major elements:

- Monitor the natural recovery of 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
  - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
  - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2.
  - Monitor the effectiveness of EMNR actions upon completion of construction.
- Construct an engineered cap over SMA 3, following excavation, as follows:
  - Procure an estimated 17,680 tons of material from a commercial upland source.
  - Construct a 2-foot-thick cap over 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
  - Monitor the physical integrity of the engineered cap upon completion of construction.
- Excavate sediments (top 2 feet) in SMA 3 as follows:
  - Remove up to approximately 12,729 cubic yards of sediments from the top 2 feet of 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
  - Excavation in the north inlet area will also require shoring to protect the adjacent upland area where an access road and underground utilities are located at the top of the slope.
  - Removal volumes include an assumed overdepth allowance of 0.25 feet and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design.
  - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.
- Manage excavated material as follows:
  - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
  - Treat water generated from temporary stockpiles for discharge as required by permits.

    - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
    - Excavations would be 2-foot thickness, matching the engineered cap thickness. No backfill would be required to match the post-excavation grades once excavated areas are capped.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Excavation residuals would be managed by capping excavated areas. Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods.

Engineered cap-on-grade monitoring and maintenance would be conducted in accordance with an approved, long-term OMM plan, which would be developed as part of remedial design. Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative would span one in-water construction season (approximately 5 months).

Figure 8.5-7 depicts a plan view of Alternative M6.

8.5.8 MARINE ALTERNATIVE 7: FULL REMOVAL FOCUS

In addition to the shoreline protection and piling and structure removal described in Section 8.5, Marine Alternative M7 would consist of the following major elements:

- Monitor the natural recovery of 8.2 acres of surface sediments in SMA 1.
- Place an EMNR layer as follows:
    - Procure approximately 13,325 tons of clean silty sand from a commercial upland or beneficial reuse source (dredged silty sand materials from the Snohomish River, for example).
    - Place a nominal 6-inch-thick layer of clean silty sand over 5.5 acres in SMA 2.
    - Monitor the effectiveness of EMNR actions upon completion of construction.
- Excavate sediments (estimated depths 2, 4, 9 feet) in all of SMA 3 as follows:
    - Remove up to approximately 24,371 cubic yards of sediments from the top 2, 4, or 9 feet of 2.9 acres in SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Excavation in the inlet area will also require shoring to protect the adjacent upland area where an access road and underground utilities are located at the top of the slope.
    - Removal volumes include an assumed overdepth allowance of 0.25 feet and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design.
    - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.

- Manage excavated material as follows:
    - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
    - Treat water generated from temporary stockpiles for discharge as required by permits.
    - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
    - Excavations would target all sediment exceeding RALs in SMA 3. No capping would be necessary in SMA 3; excavations would be backfilled to match the post-excavation grades.
- Backfill sediments in the SMA 3 excavation footprint:
    - Procure an estimated 24,371 cubic yards of material from a beneficial use and/or commercial source.
    - Place backfill over the removal footprint using land-based low ground pressure equipment and placement methods as appropriate to bring grades in the excavation footprint to match the original grades.
    - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Excavation residuals would be managed by capping excavated areas. Placement of EMNR material and engineered caps using land-based equipment and working in the dry will allow for more accurate placement and verification than through water column subtidal placement methods.

Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative could span multiple in-water construction season (approximately 7 to 8 months).

Figure 8.5-8 depicts a plan view of Alternative M7.

8.5.9 MARINE ALTERNATIVE 8: FULL REMOVAL

In addition to the shoreline protection and piling and structure removal described in Section 8.5, Marine Alternative M7 would consist of the following major elements:

- Excavate sediments (estimated depths 2, 4, 9 feet below mudline) in SMA 1, SMA 2, and SMA 3 as follows:
    - Remove up to approximately 103,000 cubic yards of sediments from the top 2, 4, or 9 feet of 16.6 acres including SMA 1, SMA 2, and SMA 3 using land-based low ground pressure equipment and placement methods as appropriate.
    - Excavation in the inlet area will also require shoring to protect the adjacent upland area where an access road and underground utilities are located at the top of the slope.

  - Removal volumes include an assumed overdepth allowance of 0.25 feet and are scaled up by 20% to account for engineering factors (side slopes, level cuts, etc.) that would need to be considered during remedial design.
  - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.
- Manage excavated material as follows:
  - Temporarily stockpile excavated material in an upland stockpile area constructed to contain all water generated from sediment dewatering and precipitation.
  - Treat water generated from temporary stockpiles for discharge as required by permits.
  - Dispose of the dewatered excavated material in an offsite Subtitle D landfill.
  - Excavations would target all sediment throughout the Site (SMA 1, SMA 2, and SMA 3). No capping, MNR, or EMNR would be necessary following remediation; excavations would be backfilled to match the post-excavation grades.
- Backfill sediments in the SMA 3 excavation footprint:
  - Procure an estimated 103,000 cubic yards of material from a beneficial use and/or commercial source.
  - Place backfill over the removal footprint using land-based low ground pressure equipment and placement methods as appropriate to bring grades in the excavation footprint to match the original grades.
  - Remove temporary shoring used to protect the slope adjacent to the upland side of the excavation.

Removal in this alternative would entail accessing excavation areas from the shoreline at low tide using land-based equipment. Long-term monitoring would be subject to the same sampling scope and approval considerations as described for Alternative M2. The estimated construction duration for this alternative could span multiple in-water construction seasons (approximately 18 months).

Figure 8.5-9 depicts a plan view of Alternative M8.

9. EVALUATION BASIS FOR CLEANUP ACTION ALTERNATIVES

This section presents a description of the threshold requirements for cleanup actions under MTCA and the additional criteria used to evaluate the cleanup action alternatives.

9.1 MTCA THRESHOLD REQUIREMENTS

Cleanup actions are subject to the threshold requirements set forth in WAC 173-340-360(2)(a). Under the threshold requirements, the cleanup action shall:

- Protect human health and the environment
- Comply with cleanup standards
- Comply with applicable state and federal laws
- Provide for compliance monitoring

9.1.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Cleanup actions performed under MTCA must ensure that both human health and the environment are protected as a result of the action.

9.1.2 COMPLIANCE WITH CLEANUP STANDARDS

Compliance with cleanup standards requires, in part, that cleanup levels are met at the applicable points of compliance. Where a cleanup action involves containment of soils and sediments with hazardous substance concentrations exceeding cleanup levels at the point of compliance, the cleanup action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met, specifically:

- The remedy is permanent to the maximum extent practicable
- The remedy is protective of human health
- The remedy is protective of terrestrial ecological receptors
- Institutional controls are implemented
- Compliance monitoring is provided (also a threshold requirement) with periodic reviews
- The type and amount of hazardous substance remaining on-site, and measures to prevent migration of, and contact with, these substances are specified.

9.1.3 COMPLIANCE WITH ARARS

Cleanup actions under MTCA must comply with applicable state and federal laws. The term “applicable state and federal laws” includes legally applicable requirements, and those requirements that Ecology determines to be relevant and appropriate as described in WAC 173-340-710.

9.1.4 PROVISION FOR COMPLIANCE MONITORING

The cleanup action must allow for compliance monitoring in accordance with WAC 173-340-410. Compliance monitoring consists of protection monitoring, performance monitoring, and confirmation monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards. Confirmation monitoring is conducted to confirm the long-term effectiveness of the cleanup action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained.

9.2 ADDITIONAL MTCA REQUIREMENTS

For cleanup actions that meet the threshold requirements, the selected action shall:

- Use permanent solutions to the maximum extent practicable;
- Provide for a reasonable restoration time frame; and
- Consider public concerns.

9.2.1 USE PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

MTCA requires that when selecting from cleanup action alternatives that fulfill the threshold requirements, the selected action shall use permanent solutions to the maximum extent practicable (WAC 173-340-360[2][b][i]). MTCA specifies that the permanence of these qualifying alternatives shall be evaluated by balancing the costs and benefits of each of the alternatives using a DCA in accordance with WAC 173-340-360(3)(e).

9.2.2 PROVIDE FOR A REASONABLE RESTORATION TIME FRAME

In accordance with WAC 173-340-360(2)(b)(ii), MTCA places a preference on those cleanup action alternatives that, while equivalent in other respects, can be implemented in a shorter period of time. MTCA includes a summary of factors to be considered in evaluating whether a cleanup action provides for a reasonable restoration timeframe (WAC 173-340-360[4][b]).

9.2.3 CONSIDER PUBLIC CONCERNS

Ecology will consider public comments submitted during the RI/FS process in making its preliminary selection of an appropriate cleanup action alternative. This preliminary selection is subject to further public review and comment when the proposed remedy is published by Ecology in a draft CAP. While public concerns are addressed by Ecology through the review process, they are also expressly considered as an element of the DCA evaluation for each alternative.

9.2.4 ADDITIONAL SMS EVALUATION CRITERIA

Remedy selection criteria under SMS regulations are generally the same as those required under MTCA. The SMS evaluation criteria are specified in WAC 173-204-560(4)(f) through (k). While most of the requirements have a direct correlation to MTCA criteria, three additional SMS criteria are not specifically addressed by MTCA:

- Use of recycling, reuse, and waste minimization
- Consideration of environmental impacts
- Alternatives that achieve cleanup standards within 10 years of completion of construction of the active components of the cleanup are presumed to have a reasonable restoration timeframe

These criteria are discussed in more detail in Section 9.3.

9.3 MTCA DISPROPORTIONATE COST ANALYSIS AND OTHER CRITERIA

The MTCA/SMS DCA described in WAC 173-340-360(3)(e) is used to evaluate which of the alternatives that meet the threshold requirements are protective to the maximum extent practicable. This analysis involves comparing the costs and benefits of alternatives and selecting the alternative whose incremental costs are not disproportionate to the incremental benefits. The evaluation criteria for the DCA are specified in WAC 173-340-360(3)(f), and include protectiveness, permanence, effectiveness over the long term, management of short-term risks, implementability, consideration of public concerns, and costs.

Commented [AM(38]: Based on this there is no need to do DCA or cost estimate for Alternative 1 of both upland and marine section.

In order to favor the benefits of criteria associated with the primary goals of the remedial action, a weighting system was used in this FS for the DCA. That is, the criteria associated with environmentally based benefits are more highly weighted than other criteria that are associated with non-environmental factors. Each of the MTCA/SMS criteria used in the DCA and the weighting factors ascribed to the criteria are described below.

9.3.1 PROTECTIVENESS

The cleanup action alternatives are evaluated for overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality. For this FS, a weighting factor of 30% was applied toward the overall benefit analysis. The high weight placed on protectiveness relative to the other factors is warranted due to the overall importance of protection of human health and the environment as a primary goal of cleanup at the Site.

9.3.2 PERMANENCE

The permanence of a cleanup action is defined as the degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated. A weighing factor of 20% was assigned to the numeric values associated with this evaluation criterion.

9.3.3 EFFECTIVENESS OVER THE LONG TERM

Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The MTCA and SMS regulations provide guidelines for ranking cleanup action components when assessing the relative degree of long-term effectiveness. These elements are, in descending order: reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or off-site disposal in an engineered, lined and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring. The MTCA preference ranking must be considered along with other site-specific factors in the evaluation of long-term effectiveness. The site-specific factors included in the long-term effectiveness evaluation include climate change and seismic vulnerabilities. A weighting factor of 20% was assigned to the long-term effectiveness criterion.

9.3.4 MANAGEMENT OF SHORT-TERM RISKS

This criterion considers potential risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks. Examples of risks include potential exposure to hazardous substances by site workers during implementation, mobilization of contaminants during construction, or general safety risks and construction hazards. A weighting factor of 10% was assigned to this criterion. This lower rating is based on the limited timeframe associated with the risks and the general ability to correct short-term risks during construction without significant effect on human health and the environment.

9.3.5 TECHNICAL AND ADMINISTRATIVE IMPLEMENTABILITY

This criterion considers the ability of a selected remedy to be implemented, including consideration of whether the alternative is technically possible, the availability of necessary off-site facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions. The weighting factor for implementability is 10%. Implementability is less associated with the primary goal of the cleanup action—protection of human health and the environment—and therefore has a lower weighting factor. In addition, the issues associated with the implementability are reflected in the remedy costs.

9.3.6 CONSIDERATION OF PUBLIC CONCERNS

The public involvement process under MTCA and SMS is used to identify potential public concerns regarding cleanup action alternatives. The extent to which an alternative addresses those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, and other organizations with an interest in the Site. The weighting factor used for this criterion was 10%. Similar to the applied factor for implementability, the low weighting of public concerns prevents duplication of issues that are addressed with other criteria. Historically, public concerns for most sites are typically related to environmental concerns and performance of the cleanup action, which are addressed under other MTCA/SMS criteria such as protectiveness and permanence.

9.3.7 COST

The costs to implement the cleanup action alternatives are evaluated, including the direct and indirect cost of construction, the long-term monitoring costs, and agency oversight costs that are cost recoverable. Long-term costs include cap maintenance costs, monitoring costs, and the cost of maintaining institutional controls. The design life of the cleanup action has been estimated and the cost of replacement or repair of major elements has been included in the cost estimate. Costs were compared against benefits to assess cost-effectiveness and practicability of the cleanup action alternatives. No weighting factor was applied to this quantitative category.

9.3.8 ADDITIONAL SMS CRITERIA

The following additional criteria are considered under SMS. While not specifically incorporated as a score under the DCA, these criteria can be used to help differentiate alternatives that otherwise score similarly under the DCA, and thus are given a relative ranking compared to the other alternatives, as opposed to an absolute score.

9.3.8.1 USE OF RECYCLING, REUSE, AND WASTE MINIMIZATION

The use of recycling, reuse, and waste minimization for a given alternative considers whether materials can effectively be beneficially reused. Opportunities include beneficial reuse of tidal mudflat sediments that may be excavated or dredged during cleanup actions as backfill for upland excavations, and beneficial reuse of suitable dredged sediments for residuals cover, backfill or cap materials generated by another project that would otherwise be disposed of in a DMMP open-water disposal site. Beneficial reuse of suitable sediments for cover and cap material can result in significant cost efficiency and is desirable from a resource standpoint. Depending on the final cleanup actions selected, Ecology and JELD-WEN would continue to explore opportunities and sources of beneficial reuse materials in greater detail during remedial design.

9.3.8.2 CONSIDERATION OF ENVIRONMENTAL IMPACTS

This criterion considers potential risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks. Examples of risks include potential exposure to hazardous substances by Site workers during implementation, mobilization of contaminants during construction, or general safety risks and construction hazards. As described in the SMS regulations, this evaluation criterion considers the following for sediment remedies:

- Significant short-term environmental impacts
- Significant long-term environmental impacts
- Significant irrevocable commitments of natural resources
- Significant environmental impacts that cannot be mitigated

Short term-impacts to habitat functions and water quality, including turbidity associated with dredging and capping, are considered under this criterion. In addition, emissions related to the construction activity, both on the water and off-site (through transloading and shipment of materials) are also considered. Irrevocable commitments of natural resources are also considered, such as the use of aggregates from commercial or other sources for cap material and the use of fossil fuel for construction equipment.

Typically, longer-duration construction projects will have the highest potential environmental impacts due to air quality issues associated with greenhouse gas emissions from construction equipment. Furthermore, sediment remedies that include dredging will have relatively higher environmental impacts due to dredging releases and turbidity.

10. EVALUATION OF CLEANUP ACTION ALTERNATIVES

This section provides detailed evaluation of the upland and marine area cleanup action alternatives. Each alternative is discussed independently relative to the MTCA criteria used in the DCA, and a raw score is provided for the alternative, on a scale of 1 to 10. In this scheme, a raw score of 10 is the highest (i.e. the most favorable) potential ranking, and a raw score of 1 represents the least favorable potential raking. Raw scores are carried forward into the DCA, where they are weighted according to the factors discussed in Section 9.

10.1 UPLAND AREAS

Consistent with MTCA regulations and Ecology guidance, the upland remedial alternatives were evaluated for the seven criteria listed in WAC 173-340-360(3)(f). These criteria include protectiveness, permanence, effectiveness over the long term, management of short-term risks, technical and administrative implementability, consideration of public concerns, and cost. The minimum requirements for cleanup actions (WAC 173-340-360(2)) were also considered in the evaluation.

The results of the evaluation are summarized below by area and presented as a numeric scoring system in Table 10.1-1 (Creosote Area) and Table 10.1-2 (Woodlife Area). Figure 10.1-1 (Creosote Area) and Figure 10.1-2 graphically depict the costs and benefits based on the discussion and scoring described in this section. For reference, a summary of the treatment technologies by area (on-property vs off-property, shallow vs deep, etc.) for each alternative are presented in Table 8.4.1-1.

10.1.1 CREOSOTE AREA

Commented [AM(39]: Adjust the language in the text based on Ecology provided DCA matrix and narrative.

The six cleanup action alternatives for the Creosote Area described in Section 8.4.1 were evaluated in detail using the MTCA threshold and additional criteria, and the DCA criteria provided in WAC 173-340-360 as described above. The evaluation is provided in Table 10.1-1 and described in detail below.

PROTECTIVENESS

Protection of human health and the environment is a threshold requirement. Alternative 1 leaves contamination in place with long-term engineering and institutional controls and does not provide for a reasonable restoration timeframe; therefore, Alternative 1 scores the lowest possible score. Alternative 6 reduces the mobility of shallow contaminants but leaves deeper contamination in place. Alternatives 2, 3, 4, and 6 remove or treat the majority of contamination from the Site; Alternative 4 scores slightly higher than Alternatives 2 and 3 due to the greater degree of certainty associated with removal and the shorter restoration timeframe. Alternative 5 destroys Site contamination, reducing mobility, toxicity, and volume to meet Site cleanup levels and therefore scores highest.

PERMANENCE

Contaminants in the Creosote Area have low mobility; higher scoring is provided for alternatives that primarily reduce toxicity or volume. Alternative 1 does not reduce toxicity, mobility, or volume, but ensures exposure pathways remain incomplete through engineering and institutional controls. Because it does not reduce toxicity or volume of contamination on the Site, Alternative 1 scores the lowest of the alternatives considered. Alternatives 4 and 5 permanently remove or treat the majority of contamination on the Site; however, Alternative 5 provides for the most complete treatment of the Site and therefore scores the highest. Alternatives 2, 3, and 6 achieve similar levels of reduction in toxicity and volume for Site contamination. Alternative 6 scores slightly higher than Alternatives 2 or 3 due to the additional treatment proposed for the off-property vadose zone.

EFFECTIVENESS OVER THE LONG-TERM

Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex treatment technologies and technologies requiring longer durations generally are ranked lower. Scores reflect MTCA's preferences for (in order) recycling/reuse, destruction/detoxification, immobilization/solidification, off-site disposal, isolation/containment, and institutional and engineering controls. Alternative 1 includes barriers to prevent exposure to hazardous substances but requires long-term monitoring to demonstrate compliance, and therefore scores the lowest. Alternative 5 scores highest due to the complete destruction of hazardous substances on Site within an approximately 2-year period. Alternatives 2, 3, and 4 score similarly since Alternatives 2 and 3 destroy contamination over a longer period that requires some monitored natural attenuation, while Alternative 4 relies on off-site disposal for on-property contamination and the same technology as Alternative 2 for off-property contamination.

MANAGEMENT OF SHORT-TERM RISKS

Scoring for management of short-term risks uses a relative scale to evaluate construction risks to human health and safety; larger more complex projects are considered to carry greater risk than simpler smaller projects. Technology-specific risks have been considered (e.g. thermal treatment has temperature related risks, excavation has cave-in, heave, and shoring risks, ISCO has chemical handling risks, etc.).

Alternative 1 poses minimal short-term risks, and therefore scores the highest. Alternative 2 includes only modest installation risks for the drilling and system installation of the Bio system and therefore is the next highest score. Alternative 3, on-property ISCO treatment, poses an elevated risk of worker injury associated with handling and injecting high-ionic strength solution, as well as potential risk of damage to near-surface utilities. Alternatives 4, 5, and 6 pose significant short term risks that include high potential risk of worker injury that may include excavation failures, potential burns or damage associated with high pressure steam, injuries associated with building demolition, and/or damage to near surface utilities and are therefore ranked the lowest.

TECHNICAL AND ADMINISTRATIVE IMPLEMENTABILITY

The scoring evaluates the overall difficulty of implementing each of the proposed alternatives considering the size and complexity of the project, maturity of the remedial technology for the Site conditions and contaminants, and availability of local experienced contractors and materials. Because it can be readily implemented with minimal difficulty Alternative 1 scores the highest. Alternatives 2 and 3 use mature technologies that have been demonstrated to be effective for conditions observed at the Site and comprise projects of moderate size and complexity. Alternative 3 requires chemical amendments that are more difficult to procure and safely handle at the scale required for treatment, and therefore ranks slightly lower than Alternative 2. Alternative 5 also uses mature technology that has demonstrated efficacy at the Site but includes a greater degree of complexity to construct and operate throughout the entire period required to reach cleanup levels. Both Alternatives 4 and 6 require prolonged, extensive, high-risk demolition, construction, and restoration to be fully implemented and therefore score the lowest.

CONSIDERATION OF PUBLIC CONCERNS

Alternatives were scored based on the balance between public desire for more active clean-up actions and potentially negative impacts to the community that may include economic (prolonged shutdowns or disruption to local business), public safety (e.g. heavy haul traffic on public roads), or other nuisance (e.g. construction noise and duration) considerations. Alternative 1 has minimal public impact but offers the least active cleanup and therefore received a moderate score.

Alternatives 2 and 5 offer more active cleanup of contamination on Site with the least potential public impact and were therefore scored the highest of the Alternatives. Alternatives 3, 4, 6 all include greater public impacts including extended construction schedules, increased haul traffic on public roads, handling and injection of reactive chemicals below the water table, and prolonged disruption to business activity on the Site and were therefore scored the lowest.

COSTS

Detailed costs for each alternative are provided in Appendix M. Figure 10.1-1 provides a summary of the estimated total cost for each alternative, including construction as well as non-construction costs. Alternative 1 was the lowest cost alternative, estimated to cost $1.2 million to implement; however, as previously noted Alternative 1 does not meet all threshold requirements for cleanup actions. Alternative 2 was the most cost-effective alternative that met threshold requirements, costing $5.5 million to implement. Costs for Alternatives 3 and 5 were similar, but increased considerably from Alternative 2, ranging from $7.9 to $11.3 million dollars to implement. Alternatives 4 and 6 were the most expensive alternatives, costing between $23 and $25 million dollars to implement.

10.1.2 WOODLIFE AREA

The two cleanup action alternatives for the Woodlife Area described in Section 8.4.2 were evaluated in detail using the MTCA threshold and additional criteria, and the DCA criteria provided in WAC 173-340-360 as described above. The evaluation is provided in Table 10.1-2 and described in detail below.

PROTECTIVENESS

Protection of human health and the environment is a threshold requirement. Alternative 1 leaves contamination in place with long-term engineering and institutional controls and does not provide for a reasonable restoration timeframe and therefore scores the lowest possible score. Alternative 2 removes contamination, reducing mobility, toxicity, and volume to meet Site cleanup levels and therefore scores highest.

PERMANENCE

Contaminants in the Woodlife Area have low mobility; higher scoring is provided for alternatives that primarily reduce toxicity or volume. Alternative 1 does not reduce toxicity, mobility, or volume, but ensures exposure pathways remain incomplete through engineering and institutional controls and therefore scores the lowest. Alternative 2 permanently removes the majority of contamination in this area.

EFFECTIVENESS OVER THE LONG-TERM

Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex treatment technologies and technologies requiring longer durations generally are ranked lower. Scores reflect MTCA's preferences for (in order) recycling/reuse, destruction/detoxification, immobilization/solidification, off-site disposal, isolation/containment, and institutional and engineering controls. Alternative 1 includes barriers to prevent exposure to hazardous substances but requires long-term monitoring and therefore scores the lowest. Alternative 2 relies on off-site disposal for on-property contamination however is scored preferentially to Alternative 1.

MANAGEMENT OF SHORT-TERM RISKS

The scoring uses the relative scale of active construction to evaluate construction risks to human health and safety; larger more complex projects are considered to carry greater risk than simpler smaller projects. Technology-specific risks have been considered (e.g. excavation has cave-in and heave risks etc.). Alternative 1 poses minimal short-term risks, and therefore scores the highest. Alternative 2 poses significant short-term risks that include risks of worker injury that may include excavation failures and/or damage to near surface utilities and is therefore ranked the lowest.

TECHNICAL AND ADMINISTRATIVE IMPLEMENTABILITY

Scoring evaluates the overall difficulty of implementing each of the proposed alternatives considering the size and complexity of the project, maturity of the remedial technology for the Site conditions and contaminants, and availability of local experienced contractors and materials. Because it can be readily implemented with minimal difficulty Alternative 1 scores the highest. Alternatives 2 uses mature technologies that have been demonstrated to be effective for conditions observed at the Site and comprises a project of moderate size and complexity.

CONSIDERATION OF PUBLIC CONCERNS

Alternatives were scored based on the balance between public desire for more active clean-up actions and potentially negative impacts to the community that may include economic (prolonged shutdowns or disruption to local business), public safety (e.g. heavy haul traffic on public roads), or other nuisance (e.g. construction noise and duration) considerations. Alternative 1 has minimal public impact but offers the least active cleanup. Alternatives 2 includes greater public impacts including extended construction schedules, increased haul traffic on public roads, and prolonged disruption to business activity on the Site.

COSTS

Detailed costs for each alternative are provided in Appendix 10. Table 10.1-2 provides a summary of the estimated total cost for each alternative, including construction as well as non-construction costs. Total costs for the two alternatives for the Woodlife Area range from approximately $500,000 to $1.7 million.

10.1.3 AREA 3 (KNOLL FILL AREA)

Cleanup alternatives related to impacts identified for the Knoll Fill Area are included in the marine area alternative comparison (Section 10.2).

10.1.4 DISPROPORTIONATE COST ANALYSIS

The purpose of a DCA is to facilitate selection of the cleanup alternative that provides the highest degree of permanence to the maximum extent practicable for the conditions identified at the Site. Cleanup action alternatives for upland areas that met threshold criteria were evaluated according to the methodology provided by Ecology (2009) and per WAC 173-340-360(3)(e). Scores for each of the criteria, for each alternative were assigned as described in sections 10.1.1 and 10.1.2.

A MTCA Composite Benefit Score was calculated for each alternative by summing the product of the criterion score times the assigned weighting factor, the resulting Composite Benefit Score is the measure of human health and environmental benefit that would be realized with implementation for each cleanup alternative. For example, using the assigned weighting criteria of Protectiveness at 30%, Permanence at 20%, Long-Term Effectiveness at 20%, Short-Term Effectiveness at 10%, Implementability at 10%, and Public Concerns at 10%, and corresponding scores for each of these criteria of 7.5, 7, 6, 3, 7, and 6, respectively, the Composite Benefit Score is calculated as: (7.5)*(0.3) + (7)*(0.2) + (6)*(0.2) + (3)*(0.1) + (7)*(0.1) + (6)*(0.1) = 6.5. A score of 6.5 represents moderate to good Composite Benefit on a scale of 1 to 10, with 10 having the highest Composite Benefit and 1 having the lowest Composite Benefit.

Five of the six alternatives developed for the Creosote Area met threshold and other criteria under MTCA. Both alternatives for the Woodlife Area were evaluated, using the alternative that did not meet other criteria (Alternative 1) as a baseline for comparison.

Creosote Area

Implementing Alternative 1, which does not meet threshold criteria but does prevent exposure to contaminated media, results in a Composite Benefit Score of 3.4. The cost of Alternative 1 is estimated to be $1.2 million. To meet threshold criteria a minimum additional cost of $4.3 million dollars is required to implement Alternative 2. Alternative 2 has a Composite Benefit Score of 6.5, representing moderate to good Composite Benefit. The cost per unit of Composite Benefit Score for Alternative 1 is $353,000; the cost per unit of Composite Benefit Score for Alternative 2 is $847,000.

Alternatives 3, 4, and 6 have lower Composite Benefit Scores than Alternative 2, and therefore are less preferable than Alternative 2 both in terms of overall benefits achieved through implementation, and benefits offered per unit cost. Alternative 5 has a Composite Benefit Score of 7.2 and represents a greater degree of Composite Benefit than Alternative 2; however, Alternative 5 has an estimated cost of $11.8 million dollars compared to the $5.5 million cost for Alternative 2. This represents a relatively marginal 10% overall increase in Composite Benefit over Alternative 2 with cost increases greater than 50%.

Both Alternative 2 and Alternative 5 meet threshold and other requirements for cleanup actions specified under MTCA. Because the marginal gain in Composite Benefit offered by Alternative 5 (score 7.2) compared to Alternative 2 (score 6.5) is achieved only through incurring additional and disproportionate costs of nearly $6.3 million dollars, Alternative 2 is preferred to Alternative 5 in the DCA. Alternative 2 therefore offers the greatest Composite Benefit at the most competitive unit rate of the cleanup alternatives that were evaluated and is considered to offer the highest degree of permanence that is practicable for the Site.

Woodlife Area

Both alternatives for the Woodlife Area met the threshold requirements protecting human health and the environment by controlling risks posed through the exposure pathways and migration routes; however, only Alternative 2, soil removal, provides a reasonable restoration timeframe.

Commented [AM(40]: Therefore, Alternative 1 does not meet MTCA minimum requirements for cleanup action.

10.2 MARINE AREA

This section describes the rationale for the scoring of the nine Marine Area alternatives. A summary of the DCA for the marine area is provided in Table 10.2-1, which includes a total weighted benefit score for each alternative, total costs, and benefit/cost ratios.

10.2.1 DETAILED EVALUATION AND COMPARISON OF MARINE ALTERNATIVES

Commented [AM(41]: Rewrite the marine alternative discussion based on Ecology provided DCA matrix and narrative.

Commented [ES(42]: MTCA criteria should be evaluated on an alternatives basis.

This section describes the DCA for the Marine Area alternatives M1 through M8. Figure 10.2-1 graphically depicts the costs and benefits, as well as the benefit/cost ratio for the alternatives based on the discussion and scoring described in this section. Scoring of the alternatives is based on a semi-quantitative evaluation where each remedial technology is scored relative to the specific MTCA criterion and area of the Site (SMA), then given an area-weighted score based on the percentage of the site where the technology would be applied under each alternative. The Site areas used for this evaluation are listed in Exhibit 10.2.1.

Exhibit 10.2.1
SMA Area Summary

Area	Acreage	Percent of Site
SMA 1	8.2	49%
SMA 2	5.5	33%
SMA 3 (Inlet)	0.5	3%
SMA 3 (Southern Shoreline Areas)	2.4	15%

The delineation of SMAs was based on the following:

- SMA 1: Concentrations support SWAC-Based RALs for MNR (MNR is proposed in SMA 1 for each alternative except for Alternative M8: Full Removal)
- SMA 2: Concentrations support SWAC-Based RALs for EMNR (EMNR is proposed in SMA 2 for each alternative except Alternative M1: MNR and Source Control) and Alternative M8: Full Removal.
- SMA 3: Concentrations do not support SWAC-Based RALs of MNR or EMNR; therefore, MNR or EMNR are not proposed in SMA 3 for any alternative except Alternative M1: MNR and Source Control.

10.2.1.1 MTCA THRESHOLD CRITERIA

As discussed previously, the net sedimentation rate is relatively low at the Site. At an average rate of 0.17 ± 0.08 cm/year, the recovery time frame for a 10 cm thick bioturbated surface layer would be on the order of 50 years for Marine Alternative M1, and considerably longer for a 30 cm thick biologically active zone. Because of this extended restoration timeframe, MNR and source control alone do not meet the threshold criterion of protection of human health for all areas of the Site, and do not comply with cleanup standards. Because threshold criteria would not be met under this option, Marine Alternative M1 will not be selected as a preferred cleanup option but has been retained in the DCA for comparison purposes only.

All other proposed Marine Alternatives meet the threshold criteria of protection of human health and the environment and attain cleanup standards. Each of the remaining alternatives has been configured to meet the required cleanup standards. Alternatives M2 through M8 will meet the cleanup standard immediately following implementation. Finally, cleanup will be achieved in compliance with applicable laws for the Marine Alternatives M2 though M8.

10.2.1.2 PROTECTIVENESS

MTCA defines protectiveness as:

> "Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality." (WAC 173-340-360(3)(f)(i))

The protectiveness of each alternative was evaluated based on its effectiveness in reducing risks and achieving cleanup standards (i.e., cleanup levels at the point of compliance). The protectiveness scores used in the DCA for each alternative are summarized below and presented in Table 10.2-1 relative to the two MTCA sub-criteria: 1) protection of human health and 2) protection of the environment.

Exhibit 10.2.2 summarizes the area-weighted scores for the protectiveness evaluation of the various alternatives. A summary of the individual protectiveness scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.2
Protectiveness Scoring

Alternative	**Protection of Human Health**	**Protection of the Environment**
M1 – MNR and Source Control	6.8	8.4
M2 – Capping Focus (Armored Shoreline)	9.8	9.8
M3 – Capping Focus (Soft Shoreline)	9.8	9.8
M4a – Targeted Removal Focus: North Inlet (2-foot removal)	9.8	9.8
M4b – Targeted Removal Focus: North Inlet (4-foot removal)	9.8	9.8
M5 – Targeted Removal Focus: Southern Areas	9.8	9.8
M6 – Removal Focus	9.8	9.8
M7 – Full Removal Focus	10	10
M8 – Full Removal	10	10

Protection of Human Health

Protection of human health was scored based on how effective the alternative would be at meeting human health cleanup standards following construction. The human health risk at the Site for total PCBs is based on the SCO concentration protective of seafood consumption (30 µg/kg dw Total

PCBs). The human health risk at the Site for dioxin/furan TEQ is based on the PQL (5 ng/kg dw dioxin/furan TEQ). These human health risk-based concentrations are applied as a site-wide average concentration (SWAC). An RAL was developed for total PCBs to achieve the post-construction SWAC protective of human health. The RALs are 117 µg/kg dw Total PCBs and 8 ng/kg dw dioxin/furan TEQ. These risk-based concentrations were used to evaluate the protectiveness of human health under the various proposed cleanup technologies for each SMA within the Site.

SMA 1: Defined as areas of the Site that are less than 117 µg/kg dw Total PCBs and 8 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations achieve a post-construction SWAC that meets the human health risk-based concentrations for total PCBs and the PQL for dioxin/furan TEQ (i.e., where SWACs would meet human health or PQL-based RALs, assuming post-construction replacement values for remediated areas). Since there is no human health risk in SMA 1, all proposed technologies, including MNR, are equally effective in SMA 1, relative to protection of human health.

SMA 2: Defined as areas of the Site that are between 117 and 130 µg/kg dw Total PCBs and between 8 and 15 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations are marginally above the human health risk-based concentrations for total PCBs and the PQL for dioxin/furan TEQ. They are below the direct contact concentrations for dioxin/furan TEQ (15 ng/kg dw dioxin/furan TEQ), published in the Ecology SCUM (Ecology 2019) and the SMS total PCB concentration for benthic protection (130 µg/kg dw Total PCBs). The inherent incremental risk to human health associated with these concentrations is relatively minor. For the remedial technologies proposed in SMA 2 (MNR, EMNR, dredge to clean and backfill), EMNR and dredging are equally effective relative to protection of human health, given the surface sediment concentration in SMA 2. MNR alone would be marginally less protective than EMNR or dredging, relative to protection of human health, given the concentrations in SMA 2. MNR in SMA 2 would, however, impact the post-construction SWAC, thus reducing the protectiveness of MNR in SMA 1.

SMA 3: Defined as areas of the Site that are greater than 130 µg/kg dw Total PCBs and greater than 15 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations are above the concentrations protective of human health if left in place within the upper 1 foot of sediment at the site. MNR in SMA 3 would not achieve risk-based concentrations within the 10-year restoration timeframe. Engineered capping on-grade, dredging and engineered capping, and dredging to clean are similarly effective relative to protection of human health because they all eliminate exposure throughout the point of compliance immediately following construction. Capping on-grade was given the same score relative to dredge and cap technologies for protection of human health due to the complete replacement of the bioactive zone and chemical isolation (elimination of the direct contact exposure route) associated with both capping scenarios. Dredging was scored highest for SMA 3 because contaminated sediment would be removed; however, risks to human health from dredging residuals are not factored in this evaluation (these risks are included in the residual risk evaluation under the permanence criteria).

Each alternative was given an area-weighted score using the areas presented in Section 10.2.1 and relative protectiveness values assigned by the technology and SMA as shown in Exhibit

10.2.3. The area-weighted scores for protection of human health are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.3
Technology and SMA Scores for Protection of Human Health

Technology and SMA Scores for Protection of Human Health				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	5	1	1
EMNR	--	10	--	--
Engineered cap-on-grade	--	--	9	9
Dredge 2 feet and engineered cap	--	--	9	9
Dredge 4 feet and engineered cap	--	--	--	9
Dredge to clean and backfill	10	10	10	10

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

Protection of the Environment

Protection of the environment was scored based on how effective the alternative would be at addressing ecological risks following construction. As discussed in Appendix K, comparisons of Site tissue data with ecological risk benchmarks reveal that there is unlikely to be any potential risk to wildlife exposed to Site COPCs. The only area of the Site where sediment concentrations may have potential ecological risks are within SMA 3.

SMA 1: Defined as areas of the Site that are less than 117 µg/kg dw Total PCBs and 8 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations do not present ecological risk. As a result, all proposed technologies, including MNR, are equally effective in SMA 1 relative to protection of the environment.

SMA 2: Defined as areas of the Site that are between 117 and 130 µg/kg dw Total PCBs and between 8 and 15 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations do not present ecological risk. As a result, all proposed technologies, including MNR, are equally effective in SMA 2 relative to protection of the environment.

SMA 3: Defined as areas of the Site that are greater than 130 µg/kg dw Total PCBs and greater than 15 ng/kg dw dioxin/furan TEQ (Exhibit 7.1.2). These pre-construction surface sediment concentrations may present some ecological risk. As a result, MNR is not protective relative to environmental risks in SMA 3. Engineered capping on-grade, dredging and engineered capping, and dredging to clean are similarly effective relative to protection of the environment because they all eliminate exposure throughout the point of compliance immediately following construction. Capping on-grade was given the same score relative to dredge and cap technologies for protection of the environment due to the complete replacement of the bioactive zone and chemical isolation (elimination of the direct contact exposure route) associated with both capping scenarios. Dredging was scored highest for SMA 3 because contaminated sediment would be removed; however, risks to the environment from dredging residuals are not factored in this evaluation (these risks are included in the residual risk evaluation under the permanence criteria).

Each alternative was given an area-weighted score using the areas in Section 10.2.1 and relative protectiveness values assigned by the technology and SMA shown in Exhibit 10.2.4. The area-weighted scores for protection of the environment and are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.4
Technology and SMA Scores for Protection of Environment

Technology and SMA Scores for Protection of the Environment				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	10	1	1
EMNR	--	10	--	--
Engineered cap-on-grade	--	--	9	9
Dredge 2 feet and engineered cap	--	--	9	9
Dredge 4 feet and engineered cap	--	--	--	9
Dredge to clean and backfill	10	10	10	10

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

10.2.1.3 PERMANENCE

MTCA defines permanence as:

> The degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated. (WAC-173-340 360(3)(f)(ii))

Permanence was evaluated based on the degree to which toxicity, mobility, and quantity of contaminants would be permanently reduced by each of the alternatives. The basis for permanence scores used the two MTCA sub-criteria: 1) certainty and reliability of each alternative;

and 2) residual risks (considering relative percent mass removal of PCBs and dioxin/furan TEQ associated with each alternative).

Exhibit 10.2-5 summarizes the area-weighted scores for the permanence evaluation of the various alternatives. A summary of the individual permanence scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.5
Permanence Scoring

Alternative	Certainty and Reliability	Residual Risks
M1 – MNR and Source Control	7.8	5.4
M2 – Capping Focus (Armored Shoreline)	9.1	8.4
M3 – Capping Focus (Soft Shoreline)	9.1	8.4
M4a – Targeted Removal Focus: North Inlet (2 foot removal)	9.2	8.5
M4b – Targeted Removal Focus: North Inlet (4 foot removal)	9.2	8.5
M5 – Targeted Removal Focus: Southern Areas	9.4	9.5
M6 – Removal Focus	9.5	9.5
M7 – Full Removal Focus	9.7	9.8
M8 – Full Removal	10	9

Certainty and Reliability

The certainty and reliability criterion was scored based how each technology would permanently reduce the toxicity, mobility, or volume of contaminants when applied within each SMA. None of the proposed remedial technologies destroy or treat hazardous substances found at the Site. As discussed in Section 5, there are no ongoing releases or potential sources of releases to marine sediment at the Site, with the possible exception of PCBs in porewater at the Knoll Area (SMA 3).

SMA 1: As discussed in Section 8.2.3, areas where COC concentrations are low enough that natural recovery can be achieved within 10 years under natural net sedimentation and biodegradation rates (i.e., where SWACs would meet human health or PQL-based RALs, assuming post-construction replacement values for remediated areas) are appropriate for MNR. The certainty and reliability of MNR is very high, but only when applied in areas with appropriately low initial contaminant concentrations. Conversely, removal is a technology with very high certainty under wider range of concentrations, although at higher concentrations the certainty and reliability of removal is limited by dredging residuals.

SMA 2: As discussed in Section 8.2.4, EMNR is highly effective where natural recovery is occurring, but at a slower rate than desired. While SMA 1 surface sediment concentrations are low enough that SWACs would meet human health or PQL-based RALs following remediation, assuming post-construction replacement values for remediated areas, SMA 2 surface sediment concentrations are slightly higher. Although SMA 2 surface sediment concentrations may not meet human health or PQL-based RALs following remediation, with the application of EMNR they would. EMNR material would be applied to SMA 2 in-the-dry, which provides high certainty and reliability of this technology in SMA 2. As with MNR, the certainty and reliability of EMNR is very high, but only when applied in areas with appropriate initial contaminant concentrations. Conversely, removal is a technology with very high certainty under wider range of concentrations, although at higher concentrations the certainty and reliability of removal is limited by residuals.

SMA 3: For SMA 3 the certainty and reliability of the evaluated technologies is more variable compared to SMA 1 and SMA 2. MNR would not reduce the toxicity, mobility, or volume of PCBs or dioxin/furans within the restoration timeframe and EMNR becomes less certain and reliable as concentrations in surface sediment increase. Removal is a technology with high certainty and reliability for SMA 3. Accordingly, capping and combined removal/capping alternatives are given intermediate scores relative to removal, and MNR scores low in SMA 3. The certainty and reliability of engineered caps is improved when combined with partial removal that would reduce contaminant volume and reduce contaminant concentrations immediately below the cap layers.

Each alternative was given an area-weighted score using the areas in Section 10.2.1 and relative certainty and reliability values assigned by the technology and SMA shown in Exhibit 10.2.6. The area-weighted scores for certainty and reliability are included in the total weighted benefit scores for each alternative evaluated in Table 10.2.1.

Exhibit 10.2.6
Technology and SMA Scores for Certainty and Reliability

Technology and SMA Scores for Certainty and Reliability				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	8	1	1
EMNR	--	9	--	--
Engineered cap-on-grade	--	--	7	7
Dredge 2 feet and engineered cap*	--	--	9	8
Dredge 4 feet and engineered cap*	--	--	--	9
Dredge to clean and backfill*	10	10	10	10

Notes: -- indicates technology is not proposed in the SMA under any of the alternatives.

*Does not consider dredge residuals generated during removal actions

Residual Risks

Residual risk is scored based on the degree to which the alternative reduces contaminant mass at the Site. Each technology is evaluated and scored accordingly, relative to the areas of the Site where they may be applied.

SMA 1: Surface sediment concentrations in SMA 1 are below the concentrations that pose risks to human health or the environment. As such, the residual risks in SMA 1 associated with any of the remedial technologies, including MNR, are low. MNR has a low residual risk in SMA 1 because the SWAC, immediately following construction, would meet the SCO concentration protective of human health for total PCBs and dioxin/furan TEQ. Although contaminant concentrations in SMA 1 are relatively low, dredging could produce residual contamination that would remain following construction, which reduces the dredging score for residual risks in SMA 1.

SMA 2: Surface sediment concentrations in SMA 2 are slightly above the concentrations that may pose a risk to human health. As such, the residual risks in SMA 2 associated with the proposed remedial technologies other than MNR, are relatively low. MNR would not address residual risk in SMA 2 since contaminant concentrations would not be reduced within the restoration timeframe and the SWAC following construction would not meet concentrations protective of human health for total PCBs or dioxin/furan TEQ. Although post-construction SMA 2 surface sediment concentrations would not be adequately addressed using MNR, with the application of EMNR they would meet concentrations protective of human health for total PCBs and dioxin/furan TEQ. Placement of the EMNR material in-the-dry further ensures protective concentrations would be met. There are no residual risks in SMA 2 when EMNR material is applied given the initial contaminant concentrations. Removal in SMA 2 would remove contaminant mass; however, residual concentrations would remain and limit the ability for dredging to reduce residual risks in SMA 2.

SMA 3: For SMA 3 the residual risks associated with the evaluated technologies is more variable. MNR would not reduce the contaminant mass for PCBs or dioxins/furans within the restoration timeframe. EMNR was not a remedial option considered for SMA 3 under any of the proposed alternatives since it is less effective as surface sediment concentrations increase. Removal may provide the highest benefit relative to residual risk in SMA 3 by reducing the contaminant mass; although residuals would be generated and remain following construction. Engineered caps are highly effective at reducing the contaminant mobility but do not provide mass removal. For the cap-on-grade option, there would be no reduction in contaminant mass following construction. Dredge and cap options reduce contaminant mass and isolate contaminants that remain. Contaminant mass reduction from partial dredge and cap options is higher in the southern shoreline areas of SMA 3 where contaminants are near the sediment surface, than in the inlet area of SMA 3, where contamination extends deeper. This difference in the contaminant mass removal from dredge and cap options in areas of SMA 3 is reflected in the scoring.

Each alternative was given an area-weighted score using the areas in Section 10.2.1 and relative residual risk values assigned by the technology and SMA shown in Exhibit 10.2.7. The area-weighted scores for residual risks are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.7
Technology and SMA Scores for Residual Risks

Technology and SMA Scores for Residual Risks				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	1	1	1
EMNR	--	10	--	--
Engineered cap-on-grade	--	--	1	1
Dredge 2 feet and engineered cap	--	--	8	4
Dredge 4 feet and engineered cap	--	--	--	5
Dredge to clean and backfill	9	9	9	9

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

10.2.1.4 EFFECTIVENESS OVER THE LONG-TERM

MTCA defines effectiveness over the long-term as:

> "Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes" (WAC 173-340-360(3)(iv))

The long-term effectiveness was evaluated based on the certainty that each technology and alternative would be successful throughout the timeframe that hazardous substances would be expected to remain at the Site in concentrations exceeding cleanup levels with considerations for climate change and seismic events as discussed subsequently.

The evaluation of the long-term effectiveness of each alternative includes climate change vulnerabilities relating to sea level rise and increased occurrence of severe storms (winds, waves, increase precipitation, and flooding). These factors have the potential to reduce the long-term effectiveness of alternatives and technologies where contamination is left in place and subjected to the erosive forces from severe storms. Remedial designs for engineered caps would need to consider climate change parameters, which have some degree of uncertainty over the life of the design. In addition to climate change, vulnerability relating to earthquakes is also a consideration for the long-term effectiveness of an alternative. The marine areas of the Site are primarily intertidal mudflats. Like many marine sediments, these areas may be subject to liquefaction-induced settlement during strong earthquake shaking. Marine sediments may also be subject to erosion during a severe storm.

Marine contaminants are concentrated on relatively flat intertidal zones and are located within a larger mudflat area that is not impacted by Site COPCs. Erosive forces from increased storm intensities have more erosive potential on steeper slopes than on flatter areas. Engineered caps placed on the flat intertidal sediments may experience some cap thinning or lateral cap movement may occur during an earthquake; however, deformed or damaged caps can be easily repaired. Riprap shoreline protection will need to be designed for stability during an earthquake; however, shoreline slopes and elevation differences (between the intertidal mudflat areas and the upland ground surface) are not steep or high enough to pose a significant concern for failure during an earthquake. A more detailed evaluation of the potential effects of earthquakes and erosion would be conducted during design as warranted. Because the marine area SMAs are already subject to tidal inundation they have limited vulnerability related to sea level rise. The climate change vulnerabilities due to increased storm intensities are discussed below relative to the SMAs and technologies proposed under each alternative.

Exhibit 10.2.8 summarizes the area-weighted scores for the long-term effectiveness evaluation of the various alternatives. A summary of the individual long-term effectiveness evaluation scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.8
Long-term Effectiveness Score

Alternative	**Effectiveness over the Long-term**
M1 – MNR and Source Control	5.4
M2 – Capping Focus (Armored Shoreline)	9.1
M3- Capping Focus (Soft Shoreline)	9.1
M4a – Targeted Removal Focus: North Inlet (2-foot removal)	9.2
M4b – Targeted Removal Focus: North Inlet (4-foot removal)	9.2
M5 – Targeted Removal Focus: Southern Areas	9.3
M6 – Removal Focus	9.3
M7 – Full Removal Focus	9.7
M8 – Full Removal	10

SMA 1: Surface sediment concentrations in SMA 1 are below the concentrations that pose risks to human health or the environment. Additionally, there are no areas of deep contamination that could potentially become exposed by increased erosion related to increased storm intensity. As such, the climate change vulnerabilities SMA 1 associated with any of the remedial technologies,

including MNR, are low. MNR is highly resilient to climate change in SMA 1 because the SWAC following construction would not pose a human health risk and disturbance of these sediments would not change this risk. Similarly, removal in SMA 1 would not be subject to climate change vulnerabilities for the same reasons.

SMA 2: Surface sediment concentrations in SMA 2 are above the concentrations that pose risks to human health. As such, MNR applied as the remedial technology in SMA 2 would be highly vulnerable to climate change factors, whereas EMNR in SMA 2 is highly resilient to climate change because the SWAC following construction would not pose a human health risk and the function of EMNR material placement is not to create a stable isolation cap but to enhance the natural recovery process. EMNR material is intended to be dynamic and the performance of an EMNR remedy would be evaluated based on achieving the SWAC not achieving and maintaining a long-term stable design thickness. Removal in SMA 2 would not be subject to climate change vulnerabilities because only residual contaminant impacts would remain following construction.

SMA 3: For SMA 3, MNR applied as the remedial technology in would be highly vulnerable to climate change factors because higher concentrations would remain in surface sediment and natural recovery would be severely disrupted by storms that disturbed sediments. Engineered caps would be designed to account for future conditions using conservative climate change projections. However, due to the uncertainty with these projections engineered caps would be more vulnerable to climate change relative to alternatives that use removal in SMA 3.
Each alternative was given an area-weighted score using the areas in Section 10.2.1 and long-term effectiveness values assigned by the technology and SMA shown in Exhibit 10.2.9. The area-weighted scores for risks resulting from implementation are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.9
Technology and SMA Scores for Long-term Effectiveness

Technology and SMA Scores for Long-term Effectiveness				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	1	1	1
EMNR	--	9	--	--
Engineered cap-on-grade	--	--	7	7
Dredge 2 feet and engineered cap	--	--	8	8
Dredge 4 feet and engineered cap	--	--	--	9
Dredge to clean and backfill	10	10	10	10

10.2.1.5 MANAGEMENT OF SHORT-TERM RISKS

MTCA defines management of short-term risk as:

> *"The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks."* (WAC 173 340 360(3)(f)(v))

Short term risks are primarily associated with construction activities. Common to all active remediation alternatives, construction equipment operations result in greenhouse gas and particulate emissions, which present health risks to the adjacent community from degraded air quality. Construction itself is inherently dangerous, presenting a safety risk to workers at the Site and to the public during transportation of materials and equipment to and from the Site. To the extent that these short-term risks apply to all construction activities, the overall risk for shorter-duration and less construction-intensive projects is comparatively lower than for longer-duration and more intensive construction projects.

In addition to health and safety short-term risks, alternatives that include removal present risks to water quality because of releases associated with dredging, and to the benthic community due to short-term disruption of habitat, as well as generated dredging residuals. The magnitude of short-term water quality and sediment quality risks associated with removal alternatives are directly correlated with the volume of sediment removed. Based on these considerations, short-term risks are comparatively lower for shorter-duration actions and for EMNR or cap-on-grade where excavation is not used. The short-term risks relative to the SMAs and technologies proposed under each alternative are discussed below.

Exhibit 10.2.10 summarizes the area-weighted scores for the short-term risk evaluation of the various alternatives. A summary of the individual short-term risk evaluation scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.10
Short-term Risk Scoring

Alternative	**Management of Short-Term Risks**
M1 – MNR and Source Control	10
M2 – Capping Focus (Armored Shoreline)	9.3
M3- Capping Focus (Soft Shoreline)	9.3
M4a – Targeted Removal Focus: North Inlet (2-foot removal)	9.3
M4b – Targeted Removal Focus: North Inlet (4-foot removal)	9.3
M5 – Targeted Removal Focus: Southern Areas	9.2
M6 – Removal Focus	9.1
M7 – Full Removal Focus	8.8

SMA 1: The short-term construction risks in SMA 1 are lowest for MNR which does not include active construction, and highest for dredging which has increased risks from active construction and specifically from removal. In addition to the general construction and excavation risks discussed above, SMA 1 has some specific risks associated with excavation. SMA 1 is generally located furthest from the upland area and in lower elevation intertidal zones relative to the other SMAs. This location presents increased risks associated with shorter in-the-dry daily work windows and potentially softer, less stable, subgrades for land-based construction equipment to access and operate on. Subgrades may not support equipment, and the use of temporary access roads, crane mats, or highly specialized equipment may be required. Within SMA 1, the inlet area has unique construction risks due to steep, unstable slopes immediately adjacent to potential excavation areas, which would likely require shoring. These risks apply to active construction technologies and especially apply to excavation alternatives, which can destabilize saturated subgrades.

SMA 2: SMA 2 is also located off-shore and has similar construction risks as described for SMA 1, including shorter in-the-dry daily work windows and potentially softer, less stable, subgrades for land-based construction equipment to access. Within SMA 2, the inlet area has unique construction risks due to steep, unstable slopes immediately adjacent to potential excavation areas. In addition, SMA 2 has risks associated with excavation residuals and management of excavated material stockpiles off-site in upland areas. Similar to SMA 1, short-term construction related risks are lowest for MNR which does not entail active construction and highest for dredging. EMNR has more risk than MNR but less than dredging because access and slope stability risks are lower when no excavation is occurring. Construction activities for EMNR are also less intensive than for dredging.

SMA 3: SMA 3 has similar risks as SMA 1 and SMA 2 relating to access, excavation residuals, and management of excavated material stockpiles off-site in upland areas. The construction related risks for slope stability are highest in the inlet area of SMA 3 since this is where the deepest excavation would occur under a full removal scenario. Short-term construction related risks are lowest for MNR which does not entail active construction and highest for dredging. Engineered capping has more risk than MNR but less than dredging because access and slope stability risks are lower when no excavation is occurring. Risks associated with dredge technologies increase as the depth of excavation increases.

Each alternative was given an area-weighted score using the areas in Section 10.2.1 and relative short-term risk values assigned by the technology and SMA shown in Exhibit 10.2.11. The area-weighted scores for risks resulting from implementation are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.11
Technology and SMA Scores for Short-term Risks

Technology and SMA Scores for Short-term Risks				
Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	10	10	10

EMNR	--	9	--	--
Engineered cap-on-grade	--	--	8	8
Dredge 2 feet and engineered cap	--	--	7	7
Dredge 4 feet and engineered cap	--	--	--	6
Dredge to clean and backfill	1	5	5	5

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

10.2.1.6 TECHNICAL & ADMINISTRATIVE IMPLEMENTABILITY

Implementability is the criterion expressing the relative difficulty and uncertainty of implementing the cleanup action (Section 9.3.5). This section describes both the technical and administrative implementability considerations and scoring for the marina area alternatives.

MTCA defines technical and administrative implementability as:

> *"Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary off-site facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions."* (WAC 173 340 360(3)(f)(vi))

Exhibit 10.2.12 summarizes the area-weighted scores for the implementability evaluation of the various alternatives. A summary of the individual implementability evaluation scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.12
Implementability Scores

Alternative	**Technical Implementability**	**Administrative Implementability**
M1 – MNR and Source Control	6.8	10
M2 – Capping Focus (Armored Shoreline)	9	8.6
M3- Capping Focus (Soft Shoreline)	9	8.6
M4a – Targeted Removal Focus: North Inlet (2-foot removal)	8.9	8.7
M4b – Targeted Removal Focus: North Inlet (4-foot removal)	8.9	8.7
M5 – Targeted Removal Focus: Southern Areas	8.8	8.9

M6 – Removal Focus	8.8	8.9
M7 – Full Removal Focus	8.5	10
M8 – Full Removal	3.6	10

Technical Implementability

All the technologies included in the evaluation of alternatives incorporate well-established and proven methods of remediation. As a result, materials are readily available locally and there is a pool of qualified contractors. The technical challenges and complexities that impact the feasibility of the proposed technologies generally include excavation in the inlet area, where there are technical challenges associated with slope stability and shoring; and excavation, in areas with deeper cuts or cuts that are further from the shoreline where subgrade stability and access present additional challenges.

SMA 1: The technical implementability in SMA 1 is highest for MNR, which does not require active construction, and lowest for dredging, which requires active construction and the associated challenges of access for construction equipment. These conditions can present technical challenges and complexities that reduce the technical implementability by adversely impacting construction schedules, reducing production rates, impacting worker safety, and creating contractual issues such as claims and change orders based on unexpected site conditions.

SMA 2: The technical implementability in SMA 2 is highest for EMNR which does not require excavation but still presents challenges associated with active construction including access for construction equipment. MNR in SMA 2 would not be sufficiently protective based on the contaminant concentration limiting the technical implementability of MNR in SMA 2. The technical implementability of dredging in SMA 2 is also limited by challenges and increased complexity associated with access and slope stability. Again, these challenges reduce the technical implementability by adversely impacting construction schedules, reducing production rates, impacting worker safety, and creating contractual issues such as claims and change orders based on unexpected site conditions.

SMA 3: SMA 3 has similar challenges to SMA 1 and SMA 2 that reduce the technical implementability of removal alternatives. In the inlet area of SMA 3 there is increased complexity associated slope stability since this is where the deepest excavation would occur under a full removal. Additionally, excavation dewatering may be necessary to achieve the deepest excavations in the inlet. MNR would not be sufficiently protective or technically feasible in SMA 3, based on the contaminant concentrations. Engineered capping has fewer challenges and complexities than dredging in SMA 3 because slope stability would not be affected by capping. Combined dredging and capping alternatives have technical feasibilities that fall between dredging to clean and cap-on-grade, with increase complexity associated with greater depths of excavation.

Each alternative was given an area-weighted score using the areas in Section 10.2.1 and relative short-term risk values assigned by the technology and SMA shown in Exhibit 10.2.13. The area-weighted scores for risks resulting from implementation are included in the total weighted benefit scores for each alternative evaluated in Table 10.2-1.

Exhibit 10.2.13
Technology and SMA Scores for Technical Implementability

Technology	SMA 1	SMA 2	SMA 3(south shoreline)	SMA 3 (inlet area)
MNR and source control	10	5	1	1
EMNR	--	8	--	--
Engineered cap-on-grade	--	--	8	8
Dredge 2 feet and engineered cap	--	--	7	6
Dredge 4 feet and engineered cap	--	--	--	4
Dredge to clean and backfill	2	5	6	2

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

Administrative Implementability

There are also administrative challenges associated with the proposed technologies that impact implementability. Administrative challenges include regulatory approvals, permitting requirements and potential land use or navigational restrictions associated with environmental caps (institutional controls).

SMA 1: The two remedial technologies evaluated for SMA 1 are MNR and dredge to clean and backfill. These technologies would not be difficult to permit or require institutional controls; therefore, their administrative implementability is high.

SMA 2: The three remedial technologies evaluated for SMA 2 are MNR, EMNR, and dredge to clean and backfill. These technologies would not be difficult to permit or require institutional controls; therefore, their administrative implementability is high.

SMA 3: The three remedial technologies evaluated for SMA 3 are MNR, capping, and dredge to clean and backfill. MNR and dredging to clean would not be difficult to permit or require institutional controls; therefore, their administrative implementability is high. Dredge and cap technologies may require institutional controls potentially limiting land use or navigation; however, caps would be constructed on privately-owned intertidal marine parcels it is anticipated that requirements for institutional controls would be less onerous than for caps placed on public land. The potential requirement for institutional controls reduces the administrative implementability for dredge and cap technologies in SMA 3. Engineered cap-on-grade technology in SMA 3 would result in increased post-construction surface elevations. This may present increased permitting challenges as well as possibly requiring institutional controls, making the engineered cap-on-grade option least administratively implementable.

Exhibit 10.2.14
Technology and SMA Scores for Administrative Implementability

Technology	**SMA 1**	**SMA 2**	**SMA 3(south shoreline)**	**SMA 3 (inlet area)**
MNR and source control	10	10	10	10
EMNR	--	10	--	--
Engineered cap-on-grade	--	--	2	2
Dredge 2 feet and engineered cap	--	--	4	4
Dredge 4 feet and engineered cap	--	--	--	4
Dredge to clean and backfill	10	10	10	10

Note: -- indicates technology is not proposed in the SMA under any of the alternatives.

10.2.1.7 CONSIDERATION OF PUBLIC CONCERNS

MTCA defines consideration of public concerns as:

> *"Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site."* (WAC 173 340 360(3)(f)(vii))

The public involvement process under MTCA is used to identify potential public concerns regarding cleanup action alternatives. The extent to which an alternative would address those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, local businesses, and other organizations with an interest in the cleanup action. Potential impacts to cultural resources from a given remedy and potential impacts during remedy implementation are considered under this evaluation criterion. Ecology will continue to evaluate public concerns through the public involvement process as the CAP is developed.

Input from members of the community is used to shape the remedial actions with respect to timing, local or cultural considerations, effects from disturbances including noise, light, and traffic that result from implementation methods or transportation routes, and the like. Different members of the community may have different priorities, and these priorities may or may not be aligned with the goals of the cleanup and/or the specific requirements of MTCA. Consistent with cleanup evaluations conducted by Ecology at other similar cleanup sites, preliminary consideration of public concerns for this disproportionate cost analysis balanced two potentially conflicting public interests:

1. One interest is environmental and generally supports remedial actions that remove the maximum amount of contamination

2. Another interest is economic and generally supports remedial actions that achieve regulatory requirements while minimizing impacts on local businesses

The consideration of public concern scores for each alternative are presented in Exhibit 10.2.15 and in Table 10.2-1. The scores are based on the degree that an alternative may balance these potentially conflicting priorities. In contrast to the other disproportionate cost analysis criteria, which tend to favor alternatives at one end of the range or the other, consideration of public concerns tends to score alternatives in the middle the highest, because of these countervailing priorities.

Exhibit 10.2.15 summarizes the area-weighted scores for the Consideration of Public Concerns evaluation of the various alternatives. A summary of the individual Consideration of Public Concerns evaluation scores for each technology, as it applies to a specific SMA, follows.

Exhibit 10.2.15
Consideration of Public Concerns Scores

Alternative	**Score**
M1 – MNR and Source Control	6.8
M2 – Capping Focus (Armored Shoreline)	9.1
M3- Capping Focus (Soft Shoreline)	9.1
M4a – Targeted Removal Focus: North Inlet (2-foot removal)	9.2
M4b – Targeted Removal Focus: North Inlet (4-foot removal)	9.2
M5 – Targeted Removal Focus: Southern Areas	9.4
M6 – Removal Focus	9.5
M7 – Full Removal Focus	10
M8 – Full Removal	3.9

There has been no input from the public on the proposed remedial alternatives for the Site to date. The following evaluation is based on general public concerns expressed on other similar cleanup sites in the Puget Sound relative to the remedial technologies included in the alternatives for each SMA.

SMA 1: It is expected that, overall, the public would generally favor MNR and generally oppose removal in SMA 1. It is anticipated that the disruption to the community from removal, including noise, light, traffic, and possibly to cultural resources, would outweigh any perceived benefits from active construction, given that there are no risks to human health or the environment in SMA 1.

SMA 2: It is expected that, overall, the public would favor EMNR in SMA 2. It is anticipated that the added disruption to the community from removal, including noise, light, traffic, and possibly to cultural resources, would outweigh any perceived additional benefits from removal, given that risks to human health and the environment in SMA 2 can be fully addressed by EMNR. It is anticipated that the public would oppose MNR in SMA 2, since there some human health risks that would remain beyond the restoration timeframe.

SMA 3: It is expected that, overall, the public would strongly favor removal in SMA 3, given that these are the areas with the highest contaminant concentrations. The public would likely favor engineered capping as well, with a preference for capping alternatives that also include partial removal. It is anticipated that the public would oppose MNR in SMA 3, since human health and environmental risks would remain following construction.

10.2.1.8 ADDITIONAL SMS CRITERIA

The use of recycling, reuse, and waste minimization was an evaluation criterion listed under the former SMS rule. However, specific reference to this criterion is not part of the revised SMS rule, which became effective in fall 2013. While the use of recycling and waste minimization in the context of cleanup is an important goal, recycling and waste minimization efforts are inherent to efficient and cost-effective construction projects, and there will be a natural tendency to maximize these efforts during project implementation. To the maximum extent possible, beneficial reuse opportunities will be explored both for the use of removed sediment, as well as for the imported clean cover and/or backfill materials as may be required for the marine area cleanup.

Consideration of environmental impacts will be evaluated for the selected marine area alternative through the SEPA process. SEPA considers impacts to air, animals, earth, energy, environmental health, land use, plants, public services, transportation, utilities, and water. Generally speaking, alternatives with shorter durations and that result in less disruption to the environment and public will be more likely to result in a determination of non-significance (DNS) or a mitigated DNS under SEPA. The sequential numeric ranking from least impact to most impact for each of the alternatives is M1 followed by M2, M3, M4a, M4b, M5, M6, M7, and M8 in that order.

10.2.1.9 COSTS

Detailed costs for each alternative are provided in Appendix N. Table 10.2-1 provides a summary of the estimated total cost for each alternative, including construction as well as non-construction costs. Total costs range from approximately $2,900,000 to $38,900,000 for alternatives M1 through M8.

10.2.2 ADDITIONAL MARINE AREA CLEANUP CONSIDERATIONS

10.2.2.1 PROTECTION OF CULTURAL RESOURCES

During the remedial design and permitting phase of the cleanup action, the implementing parties, in consultation with the Washington Department of Archaeology and Historic Preservation, the Tulalip Tribe, and other stakeholders as appropriate, will identify areas that may be affected by the cleanup action. These areas will include locations where cleanup-related disturbance may occur, including removal areas, staging areas, transport routes, and mooring areas, as appropriate. More detailed cultural resource evaluations will be integrated with studies for the engineering design phase of the project.

The cleanup action to be selected by Ecology for the Site in the forthcoming CAP will also include appropriate compliance monitoring provisions during implementation of the action, consistent with Section 106 requirements of the National Historic Preservation Act and Washington State laws. Detailed compliance monitoring plans will be developed during the remedial design and permitting phase, consistent with regulatory requirements. Appropriate cultural resource work plans, including a cultural resources treatment plan and an inadvertent discovery plan, will be included in the engineering design reports.

11. DCA SUMMARY AND CLOSING

Commented [AM(43]: Update this chapter based on Ecology provided alternatives and DCA.

This section summarizes the rationale for the selection of the preferred cleanup action alternatives for the upland areas and marine sediments at the Site.

11.1 SUMMARY OF UPLAND CLEANUP ACTION ALTERNATIVES

Under the Agreed Order (No. DE 5095) and with Ecology's oversight, JELD-WEN performed an RI that evaluated the nature and extent of contamination at the Site. The RI included collecting and evaluating environmental data and evaluating physical conditions on the Site sufficiently to develop appropriate cleanup actions that are consistent with MTCA and SMS requirements. Upland evaluations were made for the three upland assessment areas (Creosote Area, Woodlife Area, and Knoll Fill Area). The alternatives presented are based on the upland RI findings, the CSM developed for each area, the IHS present in each area, and the potential range of cleanup technologies considered in this FS. A detailed analysis of alternatives was performed, including a DCA that compared the relative costs and benefits of each alternative. Based on this evaluation, the cleanup alternative for each upland area is identified below.

11.1.1 CREOSOTE AREA

Based on the analysis presented in Section 10.1.4 and the DCA, Creosote Area - Alternative 2, consisting of bioremediation and sub-slab depressurization system below the building floor slabs is the preferred cleanup alternative for the Creosote Area. Figure 10.1-1 presents the weighted score for each alternative along with the estimated cost. Table 10.1-1 presents the total Composite Benefit Score, estimated cost, and unit cost (dollars per composite benefit score increment).

11.1.2 WOODLIFE AREA

Based on the analysis presented in Section 10.1.5 and the disproportionate cost analysis, Woodlife Area - Alternative 2, consisting of soil removal is the preferred cleanup alternative for the Woodlife Area. Figure 10.1-2 presents the weighted score for each alternative along with the estimated cost. Table 10.1-2 presents the total Composite Benefit Score, estimated cost, and unit cost (dollars per composite benefit score increment).

11.1.3 KNOLL FILL AREA

The most practicable permanent cleanup action for the Knoll Fill Area is discussed in the summary of marine cleanup action alternatives (Section 10.2).

11.2 SUMMARY OF MARINE CLEANUP ACTION ALTERNATIVES

Based on the marine sediment RI findings, nine FS alternatives were developed in consultation with Ecology that range from MNR and source control to full removal. Except for the MNR and source control only approach, all alternatives meet the threshold criteria at the completion of construction (although a 10-year post-construction recovery period is allowed under MTCA/SMS regulations) applying proven and permanent technologies. Alternative 2 has the highest benefit relative to cost ratio identified in MTCA/SMS DCA evaluation.

11.3 DATA GAPS EVALUATION

Identified data gaps remain as stated in this report. Those data gaps will be addressed through assessment and technology specific testing that will be conducted as part of the drafting of the CAP with Ecology's confirmation of the preferred cleanup alternative. This includes additional assessment of groundwater impacts in the Creosote Area to refine understood extent of those impacts. Specialized testing for further evaluation of potential treatment alternatives (i.e. injections/extraction) will be completed under Ecology's oversight during CAP development.

11.4 CLOSING

JELD-WEN and Ecology have worked cooperatively to develop this revised draft RI/FS report. This report incorporates the additional Site assessment work completed including the groundwater seep assessment, the groundwater seep sampling, the North Truck Dock assessment, Knoll Area/Knoll Fill Area assessment, sampling for PCBs in all shallow monitoring wells, and the 2019 transducer study. This report incorporates the meeting discussions, conference call discussions, and comments received by email. JELD-WEN is providing Ecology with this revised draft version of the report for Ecology's review and comment. This report has not been prepared for public review/public comment. With Ecology's review and comments, JELD-WEN is prepared to issue a version of this report to Ecology for public review. With Ecology's approval of RI/FS report and agreement on the cleanup alternatives, JELD-WEN is prepared to conduct data gap and the pre-design investigations in consultation with Ecology for CAP development.

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SUMMARY OF MARINE FS COSTS

July 8, 2020; JELD-WEN response to Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study

JW JELD-WEN.
WINDOWS & DOORS

7/8/2020

Mahbub Alam
Site Manager
Washington State Department of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504-7600

RE: Revised Draft RI/FS report for the former Nord Door Site, Everett, WA
FSID Number: 2757 and CSID Number: 4402

Dear Mr. Alam:

Thank you for providing JELD-WEN with your comments on the revised draft RI/FS for the former Nord Door Site. Before and during this COVID-19 pandemic, JELD-WEN has remained committed to working cooperatively with Ecology.

General

In 2008, JELD-WEN signed an Agreed Order (AO) with Ecology to complete a Remedial Investigation/Feasibility Study (RI/FS) and Cleanup Action Plan. The initial draft RI/FS was submitted to Ecology in 2013 and the second draft RI/FS report was issued in 2016. Prior to February 2019, marine components of the RI/FS were considered largely complete and much of the Site work was focused on assessment and sampling of groundwater seeps and investigation of the North Truck Dock drainage. In February 2019, JELD-WEN received a letter of preliminary, "high level" comments on the marine components of the RI/FS. Ecology and JELD-WEN collaborated on the resolution of technical matters and source control investigations through 2019 and early 2020.

For the 2020 revised draft RI/FS report, the JELD-WEN and Ecology teams started with weekly face-to-face meetings at Ecology's office in February, which then became weekly video conference calls due to COVID-19-related travel restrictions. In the initial February meeting, Ecology notified JELD-WEN that its deadline to submit the RI/FS was April 30, 2020. Thereafter, a cooperative and productive tone was continued through these meetings and the numerous interim document submittals by JELD-WEN's consultant team. The teams worked together to prepare an Ecology "approvable" RI/FS submittal by the established April 30 deadline. From these meetings and document exchanges, two sediment remediation alternatives were added to the FS analysis per Ecology's request and the DCA scoring methodology was reviewed in detail. For the uplands portion of the Site, each remediation technology and cleanup alternative for the Creosote Area was presented and discussed with Ecology.

Given our cooperative meetings, JELD-WEN and the consulting team was surprised by your latest additions, recalculations, and rescoring of the cleanup alternatives (reference June 19, 2020: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study [Site Name: JELD-WEN, Inc.; FSID: 2757]). In our opinion, Ecology had more than adequate time, throughout our collaborative discussions, to consider and incorporate additional alternatives during the development of the draft RI/FS report.

Our continued intention is to work cooperatively with Ecology. JELD-WEN is requesting a schedule extension to incorporate Ecology's comments based on Ecology's surprising and unforeseen comments, the added alternatives, the re-scoring performed by Ecology, and the significant potential cost and schedule impacts.

After our next conference call, we will better understand the necessary timeline for incorporating Ecology's comments into the report and will, thereafter, provide you with a written request for that time extension or other formal notices provided for in the AO.

Uplands Section Comments

We agree that the ground water-to-surface water pathway text in the conceptual site model (CSM) needs to be changed. The RI/FS text will be changed to mutually agreed-upon language; we currently disagree with the narrative text that Ecology provided. The groundwater to surface water pathway is completed because shallow groundwater flows radially from the upland portion of the site toward marine surface water. The Creosote Area contaminants of concern (COCs) are not a concern for this surface water pathway because of their low mobility, and their presence appears to have remained at the area of use for more than 70 years. The sporadic and low-level detections of TPH and other COCs near surface water does not appear to be associated with the release at the Creosote Area.

Ecology has directed JELD-WEN to take the narrative explanation and the DCA benefit score that Ecology provided and change the language in the FS text. We feel that the scoring and narrative Ecology provided have deficiencies. Ecology's permanence scoring seems unbalanced, given that in-situ bioremediation destroys the COCs, which would be scored the same as Ecology's proposed soil excavation and on-site treatment. Ecology's scoring for protectiveness for Alternative 2 seems low, because sub-slab depressurization would be implemented quickly and would address the short-term exposure pathway to COCs. The Technical and Administrative Implementability and Management of Short-Term risk scores do not align with the work scope proposed in Ecology's Alternative 7. Scoring for Consideration of Public Concerns should consider the nuisance factor associated with excavation and handling of the material that has a strong odor, and the associative construction activities/traffic. The COCs in the Creosote Area have been present at that location for 70+ years; it is unclear how Ecology arrived at its narrative and scoring for Consideration of Public Concerns for the seven cleanup alternatives.

The cost analysis for Ecology's Alternative 7 excluded or reduced several necessary remediation cost items. Ecology's listed costs associated with building demolition, excavation shoring, and building replacement may not reflect the work scope from Ecology's Alternative 7. Our initial review indicates that Alternative 7 costs could be disproportionate to the benefit gained. The JELD-WEN team is still reviewing the costs and analysis for this alternative. JELD-WEN is prepared to work cooperatively with Ecology on the cost analysis, hot-spot soil removal approach, and scoring of the DCA.

Marine Section Comments

Ecology acknowledges in the comment letter that the requested quantitative approach to the DCA was presented in accordance with Ecology's previous request. In its review of the submittal, Ecology determined that some of the quantitative elements of the DCA, such as area and sediment management area weighting, no longer appropriate. While we do not agree with Ecology's changed position, we can accept the update in the DCA approach. We understand that Ecology presented a new alternative to management then set out to prepare scores using a completely qualitative approach to the DCA. As a result of the move from quantitative to qualitative evaluations, there appear to be significant inconsistencies in Ecology's qualitative approach. When these are addressed, the DCA is likely to point to a different preferred alternative even using Ecology's scoring method. We acknowledge that Ecology may use its discretion to select an alternative, despite cost proportionality. The following are the issues identified with Ecology's qualitative approach to scoring:

- Ecology reduced scores for engineered capping applied under evaluation criteria where such a reduction is not applicable (protectiveness and implementability). For example, Ecology's scoring for protection of human health and the environment results in score reductions of over 50% for engineered capping scenarios, even though properly designed and maintained engineered caps protect human health and the environment equally. Both capping and removal alternatives result in identical installation of a new sediment bioactive zone, thus eliminating risk to human health and environment equally.
- Ecology applied scores for permanence and long-term effectiveness that are not properly aligned with engineered capping technology to favor removal. For example, Ecology's scoring for long-term effectiveness and for certainty and reliability includes score reductions of over 50% for engineered capping scenarios, implying that engineered caps are highly unreliable and not effective over the long-term. We believe the demonstrated success of capping at other sites does not support the low score selected by Ecology.
- Ecology applied significant score reductions for technical and administrative implementability of engineered capping alternatives without justification. This also has the effect of double-counting criteria that should be evaluated under long-term effectiveness (i.e. functioning in perpetuity and long-term monitoring and maintenance) and identifying significant permitting difficulties which are not supported by precedent. Furthermore, enhanced resilience, qualitative habitat, and ecosystem function improvements included in Alternative 3 were simply ignored in the qualitative implementability evaluation. The technical and administrative feasibility for permitting, designing, monitoring, and maintaining engineered caps should be similar to excavating soft intertidal sediments which requires addressing associated slope stability issues.
- Ecology's scoring for consideration of public concerns favors removal and is highly subjective in the absence of any public comments.

At present, JELD-WEN cannot revise the FS text to reflect Ecology's scoring because we do not understand the technical rationale for the new scoring. We suggest that the JELD-WEN and Ecology teams collaborate to develop an appropriate qualitative rationale to re-score the DCA and update the FS text accordingly.

Next Step Summary

At this stage, we believe it is critical to have a common understanding with Ecology regarding the purpose of the AO-defined deliverables and regulatory basis in Model Toxics Control Act. At the highest level, the purpose of the FS and Cleanup Action Plan (CAP) are as follows:

- FS
    - Identify methods to eliminate exposure to contamination on the site
    - Assemble methods into a range of cleanup alternatives
    - Use environmental benefit versus cost analysis to choose a preferred alternative

- CAP
    - Describe Ecology's selected cleanup action, including,
        - Cleanup standards to protect human health and the environment
        - Schedule of next steps
        - Requirements for monitoring, operations, and maintenance.

The JELD-WEN team is prepared to collaborate with Ecology to address the Upland and Marine matters including those described above, confirm the preferred alternative based on the updated scoring, and finish the RI/FS report for Ecology's approval. The CAP will further elaborate on the preferred alternative selected for implementation including the scope of pre-remedial design investigations work to be completed upon finalization. In Remedial Design, the remedial areas, removal depths, cap specifications, and potentially technology assignments may be adjusted to reflect the pre-design investigation results in consultation with Ecology.

Despite our lack of consensus on key technical details, we appreciate that Ecology has indicated its preferences for the ultimate Remedial Action to be implemented at the Site. However, those preferences result in major additional cost outlays that present significant funding challenges for JELD-WEN and other potentially liable parties that are especially impactful, given the current global pandemic. JELD-WEN will need additional time to determine how to update the RI/FS and complete the CAP required by the AO.

We look forward to the resolution of these matters, in accordance with appropriate regulations, to finally move the Site into the actionable phase of project after more than a decade of study. We appreciate Ecology's efforts and our mutual commitment to permanently protecting human health and the environment.

Respectfully,
JELD-WEN, Inc.

Bonnie J. Basden, Director Environmental Permitting

August 17, 2020; SLR email to Ecology on Revised Woodlife Area Remedial Action Alternatives

R. Scott Miller

From: R. Scott Miller
Sent: August 17, 2020 2:47 PM
To: Mahbub Alam (ECY)
Cc: Bonnie Basden
Subject: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study [Site Name: JELD-WEN, Inc.; FSID: 2757]
Attachments: Revised_WOODLIFE AREA REMEDIAL ACTION ALTERNATIVES_081220.docx; WOODLIFE FS ALT 2.pdf

Hello Mahbub,

Attached to this email are two documents related to the upland Woodlife area: the revised text from section 8.4.2 (Woodlife FS Alternatives) of the Revised Draft RI/FS report in the MS Word document and a revised Figure 8.4.2.1-B (Alternative 2 - Soil Removal), the pdf document. Changes in the text have been recorded as MS Word Track Changes mode in the attached document and are based on Ecology's comments and our subsequent phone conversations.

We are continuing to work on the other items we discussed and will have additional submittals to you soon.

Please let me know if you have any questions.

Thank you,
Scott

1.1.1 WOODLIFE AREA REMEDIAL ACTION ALTERNATIVES

The following alternatives have been assembled to address the Woodlife Area including on property impacts to soil and the associated impacts to groundwater.

1.1.1.1 ALTERNATIVE 1: ENGINEERING CONTROLS, INSTITUTIONAL CONTROLS AND LONG-TERM MONITORING

Alternative 1 for the Woodlife Area consists of engineering controls (maintaining the existing surface caps), installing additional monitoring wells for long-term monitoring, and institutional controls (see Figure 8.4.2.1-A).

The purpose of the surface capping would be to limit groundwater infiltration as well as to create a barrier to the direct exposure pathway. The majority of the Woodlife Area is currently covered by existing building slabs and surface pavements with the exception of a small ~~area of~~ landscaped area adjacent to the NTD.

Four additional groundwater monitoring wells will be installed as part of the long-term monitoring. These monitoring wells will be installed around the perimeter of the impacts identified during RI activities focused on the Woodlife Area.

Performance monitoring for Alternative 1 includes semiannual monitoring at 6 shallow monitoring wells (existing monitoring wells MW-6 and MW-7, and four newly installed monitoring wells) for 5 years; and annual monitoring for 15 years after completion of surface capping to confirm the stability and natural attenuation of the remaining groundwater contamination. In addition, annual surface capping inspections will be performed, likely in conjunction with the scheduled groundwater monitoring events. Compromised integrity of the surface capping will be documented and repaired as needed.

Once cleanup levels are met (estimated a~~A~~fter year 20 for costing purposes), the groundwater monitoring wells would be decommissioned~~, pending the analysis of groundwater samples confirming a stable or shrinking groundwater plume~~.

Institutional controls will include recording an environmental covenant to restrict the future development activities in the Woodlife Area to prevent potential exposure to contaminated media.

1.1.1.2 ALTERNATIVE 2: SOIL REMOVAL

Alternative 2 for the Woodlife Area includes soil excavation~~ followed by MNA~~, engineering controls (re-establishing the existing surface caps) and institutional controls (see Figure 8.4.2.1-B).

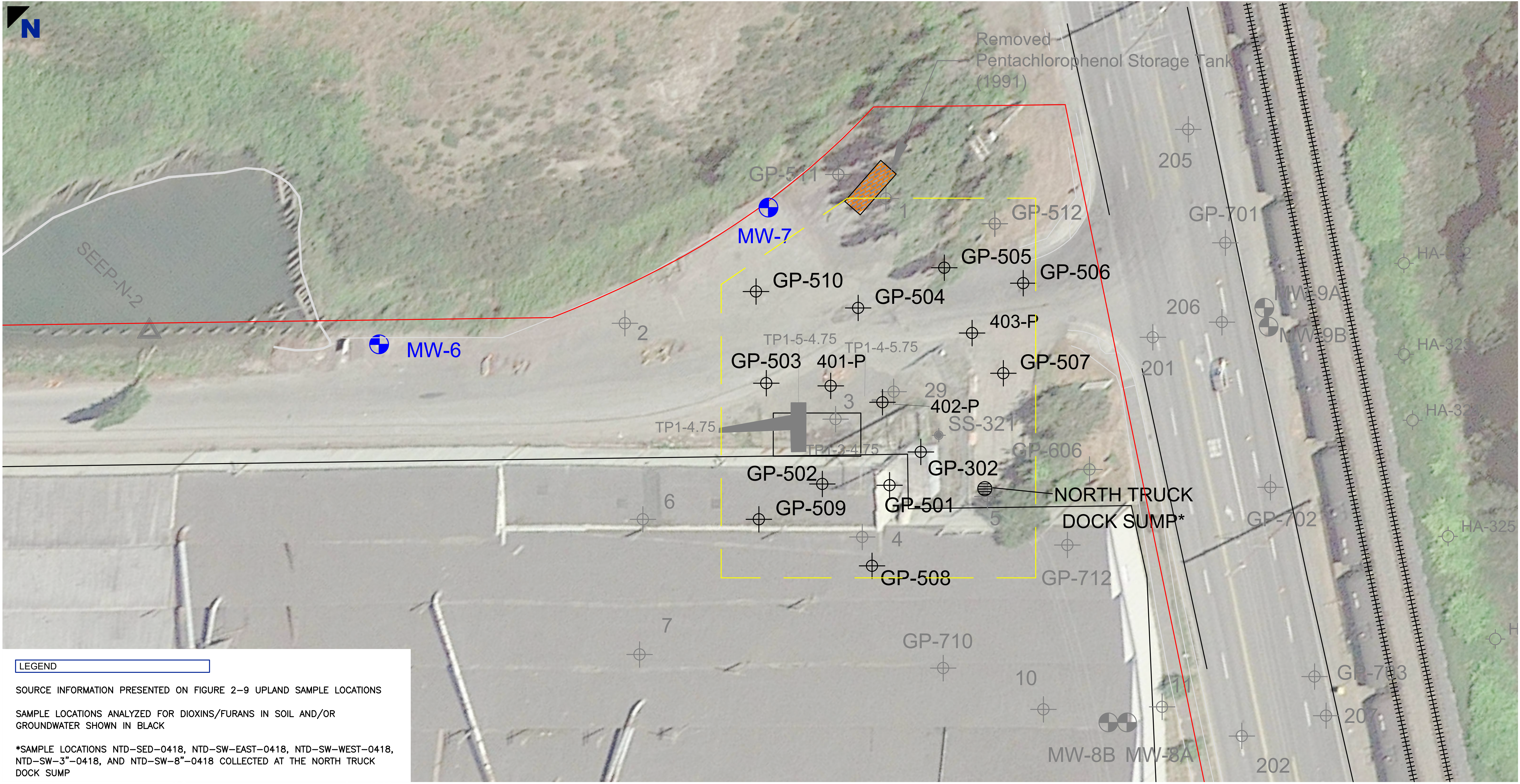
The purpose of the on-site soil excavation for the Woodlife Area would be to remove the impacted soil for off-site disposal.

After installing appropriate erosion control measures, approximately 22,000 square feet of the existing asphalt pavement and concrete surfaces (interior and exterior of existing building) would be removed. A portion of the existing main manufacturing building will need to be supported in anticipation of excavation activities that extend within the footprint of the building. Impacted soil ~~from approximately 0 to~~to an estimated maximum depth of 5 feet bgs would be excavated and hauled to an appropriate off-site disposal facility as special waste. Performance soil samples will be collected from the excavation extents and bottom to determine the ultimate extents of the excavation area and to document sufficient removal of contaminated soil to the cleanup level of 5.2 pg/g (based on background concentration). Based on the assumption that impacted soil extends to 5 feet bgs throughout the Woodlife Area, a~~A~~pproximately 5,500 tons of soil would be excavated; however, results from the RI investigation activities indicate that areas of deeper soil impacts are limited (to be confirmed via performance soil sampling). The use of dewatering equipment (Banker tanks, pumps, etc.) would likely be needed as the excavation would extend into the shallow groundwater table. The water would be treated on-site with bag filters and activated carbon before being discharged to the city sanitary sewer (pending a permit). Clean backfill would be imported and placed into the excavation. Imported material would be analytically tested prior to placement.

The backfill would be compacted and the excavation area would be finished with an estimated three inches of asphalt surface capping to match the existing surface capping to ensure contiguous surface capping throughout the contaminated area (i.e. engineering control).

~~Dioxins primarily adhere to soil and would be removed during the soil excavation. Performance soil samples will be collected from the excavation extents and bottom to document removal of contaminated soil. Performance groundwater monitoring would be performed quarterly for one year following soil removal to evaluate reductions in COC concentrations in groundwater followed by annual compliance monitoring events for an estimated 5 years to confirm cleanup action completion.~~ As the goal of the soil removal will be to remove soil impacts above the cleanup level, long-term monitoring is not proposed for this alternative; however, subsequent groundwater monitoring will be periodically performed at the existing downgradient monitoring wells MW-6 and MW-7 following soil removal activities. If the soil impacts can’t be fully delineated due to site conditions or health & safety concerns (i.e. significant groundwater infiltration causing excavation/trenching concerns), and some contamination will remain in-place, JELD-WEN will work with Ecology to determine an appropriate remediation level (REL) to guide excavation limits (e.g. 5x cleanup level).

Institutional controls would be implemented as detailed in Alternative 1 during ~~this~~ the period of post removal monitoring.



LEGEND

SOURCE INFORMATION PRESENTED ON FIGURE 2-9 UPLAND SAMPLE LOCATIONS

SAMPLE LOCATIONS ANALYZED FOR DIOXINS/FURANS IN SOIL AND/OR GROUNDWATER SHOWN IN BLACK

*SAMPLE LOCATIONS NTD-SED-0418, NTD-SW-EAST-0418, NTD-SW-WEST-0418, NTD-SW-3"-0418, AND NTD-SW-8"-0418 COLLECTED AT THE NORTH TRUCK DOCK SUMP

MW-6 ● EXISTING GROUNDWATER MONITORING WELLS

— — — ESTIMATED LIMITS OF EXCAVATION (ACTUAL HORIZONTAL AND VERTICAL EXTENTS TO BE DETERMINED BY CONFIRMATION SOIL SAMPLING)

—— APPROXIMATE PROPERTY BOUNDARY

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 45 90 135'

JELD-WEN/FORMER NORD DOOR FACILITY
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
2020 REVISED RI/FS REPORT

Drawing
WOODLIFE AREA - ALTERNATIVE 2

Date	August 2020	Scale	AS SHOWN	Fig. No.
File Name	WOODLIFE FS ALT	Project No.	108.00228.00061	8.4.2.1-B

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August 18, 2020; SLR email to Ecology on Revised Creosote/Fuel Oil Area CSM

R. Scott Miller

From: R. Scott Miller
Sent: August 18, 2020 10:28 AM
To: Mahbub Alam (ECY)
Cc: Bonnie Basden
Subject: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study [Site Name: JELD-WEN, Inc.; FSID: 2757]
Attachments: Revised_CREOSOTE AREA CSM_081720.docx

Hello Mahbub,

Attached to this email revised text from Section 5.2 (Creosote/Fuel Oil Area Conceptual Site Model). Changes in the text have been recorded as MS Word Track Changes mode in the attached document and are based on Ecology's comments and our subsequent phone conversations.

We are continuing to work on the other items we discussed and will have additional submittals to you soon.

Please let me know if you have any questions.

Thank you,
Scott

1.1 CREOSOTE/FUEL OIL AREA

A conceptual site model including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Creosote/Fuel Oil Area is provided below.

1.1.1 HISTORICAL USE

Characterization data and reported history of use indicate that the primary source of COPCs in soil and groundwater in the Creosote/Fuel Oil Area is the former pole treating operation on the Site. Prior to the early 1940s, National Pole Company operated a pole treating plant in the eastern portion of the Site and adjacent to the current placement of West Marine View Drive. Based on a review of aerial photographs and historical photos of the area it is likely that the roadway at that time was elevated on pilings (Appendix A).

Based on review of aerial photographs and historical maps, features associated with pole treating activities included two circular creosote ASTs of unknown capacity, three long rectangular ASTs possibly containing creosote, a rack for drying and storing treated poles, an oil house, and a rectangular building used as a combination lunchroom, engine room and machine shop (Figure 2.2-1), 1947 Aerial Photo with Site Features). The ~~Creosote~~ creosote ASTs, drying racks, and oil house were removed between 1943 and 1948. Pole treating operations are not observed in aerial photographs or site maps after 1948. Mudflats east adjacent to the pole treating operations and underneath the suspected elevated roadway appear to have been filled between 1938 and 1947 (Appendix A).

The Nord Door facility operated an oil-fired boiler on the eastern portion of the Site prior to 1957. Former fuel oil ASTs were located in the eastern portion of the Site along West Marine View Drive and also further to the west, beneath what is now the southern portion of the main manufacturing building. These ASTs were removed in the mid-to late-1950s.

1.1.2 PHYSICAL SETTING

The current location of West Marine View Drive historically consisted of tidally-influence mudflats that were likely filled between 1938 and 1947. Based on a review of boring logs from the Creosote/Fuel Oil Area, fill material appears to consist primarily of dredged sandy sediment with aggerate material below roadway pavement. Construction of West Marine View Drive in its current location (filled land versus elevated roadway on pilings) was completed by 1947 based on the available aerial photographs and Site maps. West Marine View Drive was modified as a wider paved roadway in the 1960’s.

Shallow groundwater has been measured as shallow as approximately 2 feet bgs and is likely influenced by surface water infiltration, site features, stormwater conveyance lines, and utilities infrastructure. Boring logs do not identify a continuous aquitard or aquiclude for the Site (Appendix F). Shallow groundwater samples at the Creosote/Fuel Oil Area have shown elevated conductivity, TDS, and salinity measurements indicating brackish groundwater conditions. The tidal influence assessment conducted in 2019 within the Creosote Area indicated changes in groundwater elevation associated with tidal swings were minimal.

Calculated shallow groundwater gradients reported during quarterly groundwater sampling activities, and data generated in the 2007 and 2019 transducer studies (Appendix G) indicate groundwater in the Creosote/Fuel Oil Area flows primarily west from the historical operations area towards Puget Sound with a gradient that averages 0.002 feet per foot (Appendix L). Groundwater below 15 feet bgs is considered "deep" groundwater for this RI/FS report. Calculated deep groundwater gradients reported during quarterly groundwater sampling activities indicate a similar westerly flow direction (Appendix G), and no vertical gradient has been measured in the paired wells (MW-8A-8B, MW-9A/9B, and MW-10A/10B).

Surface water in Maulsby Marsh flows west toward Puget Sound and drains through a culvert located on the southern edge of the marsh. Based on minimal tidal influence observed in monitoring wells in the Creosote/Fuel Oil Area, surface water elevations in Maulsby Marsh are not expected to be tidally influenced.

1.1.3 SUSPECTED AND CONFIRMED RELEASES

Based on historical documentation and analytical testing National Pole treated timber poles with a creosote wood preservative. Creosote is derived from coal tar and consists of a mixture of aromatic hydrocarbons, anthracene, naphthalene, and phenanthrene derivatives. Likely historical releases of COPCs to soil and groundwater associated with pole treating operations include spills and incidental releases of creosote to the ground associated with transporting and drying treated poles.

Releases of petroleum hydrocarbons in the Creosote/Fuel Oil Area are likely associated with the historical fuel storage tanks that were located south of the identified pole treating activities (Appendix A). The highest concentrations of COPCs in soil and groundwater were reported during pre-RI investigations in the central portion of the Creosote/Fuel Oil Area including borings GP-9, -10, -11, -12, -214, -215, and several borings under the existing West Marine View Drive (see Figure 5.2-1). Grading and filling activities associated with construction of West Marine View Drive likely resulted in burial of surficial contamination east of the primary operations area. Additional assessments focused on the Creosote/Fuel Oil Area were performed under Ecology-approved work plans.

Hand auger soil samples were collected from twelve locations in Maulsby Marsh in 2009 to assess potential impacts east-adjacent to the Site and the BNSF railroad tracks. The assessment analytical results indicate that ~~Creosote~~Creosote/Fuel Oil Area releases have not affected the marsh sediments or surface water. One soil sample (HA-329) from one-foot bgs measured elevated concentrations of TPH-Dx (diesel range) and PAHs above initial PCLs. Follow-up assessment of Maulsby Marsh sediment was completed in 2011 and it was determined that ~~Creosote~~Creosote/Fuel Oil Area-related COPCs were not present in the freshwater marsh sediments and the contaminants detected in the marsh sediments were not attributable to Site releases (see Appendix E).

Maulsby Marsh is adjacent to the BNSF railroad tracks where the application of herbicides/pesticides has been observed on the vegetated area that included sample location HA-329. Soil and groundwater analytical results from location HA-329 appear to be an outlier amongst the BNSF sampling, potentially associated with treated railroad ties, and are not considered representative of overall soil and groundwater conditions in the area between the BNSF railroad tracks and Maulsby Marsh.

1.1.4 CONTAMINANT FATE AND TRANSPORT

Soil

COPCs identified for the Site have relatively high partition coefficients and migrate slowly in soil through natural processes including density-driven flow, capillary draw, advection, and diffusion into the subsurface. RI data indicate that the migration pathway from soil to groundwater is complete at the Site; however, additional transport associated with groundwater flow through contaminated soil is also limited (see below). Droplets of non-aqueous phase liquid (NAPL) was observed in soil samples from Geoprobe boring locations, although not as a continuous unit. The presence of dense non-aqueous phase liquid (DNAPL) at depth indicates vertical migration of historical releases through density-driven flow. Soil cross sections for on-property and off-property portions of the ~~Creosote~~Creosote/Fuel Oil Area are included as Figure 5.2.4-1 and Figure 5.2.4-2

Soil Vapor

Migration of vapor from contaminated groundwater into soil gas has been assessed at the Site. Soil gas sampling from within the footprint of the existing main manufacturing building identified naphthalene and benzene exceedances of sub-slab soil gas vapor PCLs.

Groundwater

Groundwater sampling data has demonstrated that creosote impacts to soil and groundwater are localized around the former operation areas in the ~~Creosote~~Creosote/Fuel Oil Area and beneath West Marine View Drive. ~~Groundwater migration and/or seepage to surface water does not appear to be a mechanism for transport of creosote and/or fuel oil impacts at the Site.~~ Groundwater data collected during the RI/FS shows groundwater migration and/or seepage to surface water does not appear to be a significant mechanism for the transport of creosote and/or fuel oil impacts. ~~cPAH analytical results for two groundwater seeps on the north side of the Site (terminating in the “finger area”) did not measure any individual cPAH concentrations above laboratory PQLs.~~

Estimates of the shallow groundwater velocity in the ~~Creosote~~Creosote/Fuel Oil Area (Appendix L) are on the order of one-half foot per day. At this velocity, hundreds of soil porewater volume exchanges have occurred in the ~~Creosote~~Creosote/Fuel Oil Area over the estimated 70 years since the suspected release(s). However, creosote impacts to soil and groundwater remain localized in an area measuring approximately 650 by 500 feet. The analytical results indicate that groundwater transport is not a significant mechanism for ~~Creosote~~Creosote/Fuel Oil Area contaminant migration.

Deep groundwater impacts including concentrations of naphthalene (up to 15,900 ug/L, see Table 5.2-2) were reported for groundwater samples collected from deep monitoring well MW-8B. There does not appear to be a contiguous DNAPL plume in the shallow or deep zone as evidenced by NAPL only being observed as droplets in the soil matrix at select boring locations and the majority of groundwater impacts appear to be as dissolved phase; however, additional assessment is needed to define the horizontal extent of deep groundwater impacts. Sufficient deep zone groundwater plume data exists to complete the RI/FS with this identified data gap.

Surface Water and Stormwater

Creosote and fuel oil impacts at the Site in soil are primarily located at depth beneath buildings or pavement. Locations where creosote concentrations in soil exceeded the PCL in subsurface soil at unpaved areas include a thin strip of landscaping on the eastern portion of the Site and areas along the BNSF railroad ROW east of West Marine View Drive. Sediment and tissue sampling data in the adjacent marine and Maulsby Marsh areas did not identify creosote and/or fuel oil releases to surface water. Therefore, overland transport/surface runoff via stormwater is not considered a significant release mechanism for the creosote or fuel oil impacts at the Site.

Stormwater collection and transport via the on-site stormwater conveyance system has been identified as a likely potential historical contributor to sediment contamination on the north and south off-shore areas. However, the majority of the on-site stormwater conveyance system is located outside of the ~~Creosote~~Creosote/Fuel Oil Area (see Figure 3 from the SCE Summary Report, SLR, 2019a) and the primary COPCs in sediment are dioxins/furans and PCBs. Because the majority of subsurface contamination in the ~~Creosote~~Creosote/Fuel Oil Area occurs at depth, and minimal collection of stormwater occurs in the ~~Creosote~~Creosote/Fuel Oil Area, transport of ~~Creosote~~Creosote/Fuel Oil Area COPCs via the stormwater system is not considered a significant potential pathway for migration of COPCs at the Site.

1.1.5 CLIMATE CHANGE AND EARTHQUAKES

The potential effects of climate change and sea level rise are discussed in Section 3.4 of this report. Potential treatment technologies for the vadose zone within the timeframe for implementation and operation are discussed in the FS section of this report. For the ~~Creosote~~Creosote/Fuel Oil Area, it is anticipated that sea level rise will result in a corresponding rise in the groundwater table, reducing the thickness of the vadose zone, potentially limiting the effectiveness of remediation treatment technologies targeting the vadose zone. Two- and three-phase partition modeling of creosote and oils in the vadose zone (water, air, and residual oil) within a soil matrix indicate that rising sea levels will increase the oil holding capacity of the soil matrix while reducing the residual oil mobility.

A large magnitude earthquake could cause liquefaction of the silty, sandy soil identified in the ~~Creosote~~Creosote/Fuel Oil Area. An earthquake analysis/soil liquefaction analysis was not performed as part of this RI. The ~~Creosote~~Creosote/Fuel Oil Area is generally flat and significant land displacement is not expected during a liquefaction event; although a loss of bearing-capacity, settlement, and associated damage to on-site structures and roadways would be expected. Paved areas, and areas with overburden soil underlain by saturated sandy soil, could see upwelling of sandy soils into pavement base rock or onto the ground surface. The upwelling is expected to be limited to shallow depths and localized.

1.1.6 NATURE AND EXTENT OF CONTAMINATION

Soil contamination at the ~~Creosote~~Creosote/Fuel Oil Area includes TPH, PAHs, and VOCs primarily under the historical pole treating operations area with dimensions of approximately 650 feet by 385 feet (Figure 5.2-1). Soil impacts in the ~~Creosote~~Creosote/Fuel Oil Area are bounded laterally to the north, east, south and west by existing RI sampling data. Soil contamination is primarily located between approximately 5 and 15 feet bgs. Deep soil contamination was observed to a maximum depth of approximately 50 feet.

Deep monitoring well MW-8B was installed to a depth of 50 feet bgs and one year after installation, DNAPL has accumulated in the sump that was constructed at the bottom of the well. Based on previous observations at the Site, DNAPL is present in discontinuous ganglia and small pockets in the deep subsurface. A continuous DNAPL plume or lens has not been identified. Additional data collection during remedial design will bound the vertical extent of naphthalene contamination and the lateral extents of contamination at the ~~Creosote~~Creosote/Fuel Oil Area.

Shallow groundwater contamination in the ~~Creosote~~Creosote/Fuel Oil Area includes TPH, PAHs, VOCs, and SVOCs. The distribution of COPCs in groundwater is spatially consistent with the distribution observed for COPCs in soil. Shallow TPH, PAH, SVOC, and VOC contamination is limited to the historical pole treatment area and proximate to the historical fuel ASTs in the central portion of the ~~Creosote~~Creosote/Fuel Oil Area.

RI groundwater data bounds groundwater contamination in the ~~Creosote~~Creosote/Fuel Oil Area to the north, south, and west. Groundwater samples collected from hand-auger locations on the east edge of the Site were considered to represent the eastern edge of groundwater impacts because no known releases occurred in the marsh area and groundwater flows predominantly to the west.

Soil vapor is contaminated proximate to the area of shallow groundwater impacts. Neither soil nor groundwater contamination associated with the ~~Creosote~~Creosote/Fuel Oil Area extend to the marine “finger area” or into freshwater in Maulsby Marsh. No ~~Creosote~~Creosote/Fuel Oil Area COPCs were found in the adjacent Maulsby Marsh freshwater sediments.

1.1.7 AFFECTED MEDIA AND POTENTIAL EXPOSURE PATHWAYS

Results of the RI indicate that affected media at the ~~Creosote~~Creosote/Fuel Oil Area include soil, soil vapor, and groundwater and potentially complete exposure pathways related to these media in the ~~Creosote~~Creosote/Fuel Oil Area are described below.

Soil

The Property is zoned as industrial use and it is likely that industrial activities will continue to occupy the on-property portion of the ~~Creosote~~Creosote/Fuel Oil Area for the foreseeable future. Potentially complete exposure pathways for soil in the ~~Creosote~~Creosote/Fuel Oil Area include:

- Direct exposure by construction workers (e.g. dermal, incidental ingestion) associated with future on-site work or development work to a maximum depth of 15 feet or less.

- Terrestrial ecological exposure (e.g. dermal, ingestion, bio accumulative) to shallow soil in the unpaved areas only.

Shallow groundwater conditions are likely to limit potential future construction worker exposure to soil within less than approximately 5 feet from the ground surface. Due to the presence of asphalt caps, roadways, and structures on the Site, the terrestrial ecological exposure pathway is limited to a small landscaped area to the east of the main manufacturing building and the area in the BNSF ROW.

Due to the presence of shallow groundwater, surface structures, and the relatively conductive hydrogeology at the Site, no reasonable scenario exists for human or terrestrial ecological exposure to soil contamination greater than 15 feet bgs; therefore, no exposure pathway for deep soil is considered complete.

Soil Gas

Concentrations of naphthalene and benzene in soil gas samples exceeded applicable screening criteria under the existing main manufacturing building on the Site. Therefore, indoor air exposure pathway for workers on-Site is considered complete. Exposure to soil gas outside of existing buildings is unlikely due to immediate dilution by ambient air and lack of confinement to allow buildup of COPCs in the vapor phase

Groundwater

Groundwater at the Site is not considered potable because:

- It is not currently used as a source of drinking water; and,
- It contains natural background concentrations of constituents that make use of the water as a source of drinking water not practicable (brackish conditions).

Elevated Total Dissolved Solids (TDS) and/or salinity have been measured at monitoring wells MW-2, MW-3, MW-6, MW-8A, MW-9A, and MW-15, with a maximum TDS concentration of 15,490 mg/L (see Appendix G for field measurements from quarterly groundwater sampling events). Per MTCA, a TDS concentration in excess of 10,000 mg/L indicates that the groundwater contains natural background concentrations of organic or inorganic constituents that make use of the water as a drinking water source not practicable (173-340-200 (2)(b)(ii)).

In addition, according to MTCA the department recognizes that there may be sites where there is an extremely low probability that the groundwater will be used for domestic purposes because of the site's proximity to surface water that is not suitable as a domestic water supply (173-340-200 (2)(d)). While deep groundwater appears less saline than shallow groundwater, future use of deep groundwater is highly unlikely due to the potential for saltwater intrusion, difficulty of access, and the proximity to Puget Sound.

Groundwater impacts are currently contained under existing surface caps, buildings, and roadways, further limiting potential exposure. Sampling of adjacent shoreline seeps and Maulsby Marsh sediments indicates that groundwater COPCs are not ~~present~~ a concern in either media. Therefore, no complete exposure pathways were identified for shallow or deep groundwater associated with the ~~Creosote~~Creosote/Fuel Oil Area.

1.1.8 ~~CREOSOTE~~CREOSOTE/FUEL OIL AREA PROPOSED CLEANUP LEVELS

Site wide COPCs that exceed selected PCLs within the ~~Creosote~~Creosote/Fuel Oil Area are co-mingled with ~~Creosote~~Creosote/Fuel Oil Area COPCs. Based on the potentially complete exposure pathways listed above the following IHS have been selected for the ~~Creosote~~Creosote/Fuel Oil Area:

- TEQ cPAHs in soil;
- Naphthalene in groundwater; and
- Naphthalene in soil gas.

While TPH-Dx and cPAH groundwater impacts have been identified throughout the ~~Creosote~~Creosote/Fuel Oil Area (including in the deep zone), these impacts are comparatively less mobile, less widespread, and less volatile, and are therefore not appropriate IHS.

Proposed ~~Creosote~~Creosote/Fuel Oil Area PCLs are:

- ~~Soil Method B~~Saturated Soil Protective of Groundwater (soil);
- Groundwater Method B Protection of Vapor Intrusion (groundwater); and,
- Method B Sub Slab Soil Gas Screening Levels (soil gas).

Exceedances of selected PCLs for the IHS are presented in Table 5.2-1 to Table 5.2-3.

September 1, 2020; SLR email to Ecology on Revised Creosote/Fuel Oil Area FS Alternatives and DCA

R. Scott Miller

From: R. Scott Miller
Sent: September 01, 2020 1:39 PM
To: Mahbub Alam (ECY)
Cc: Bonnie Basden
Subject: Ecology Comments on 2020 Revised Draft Remedial Investigation/Feasibility Study [Site Name: JELD-WEN, Inc.; FSID: 2757]
Attachments: ALTERNATIVE 7-updated.docx; CREOSOTE FUEL OIL ALT 7.pdf; Alternative 7 revised cost.xlsx; revised creosote DCA 8-2020.xlsx

Hello Mahbub,

Attached to this email are documents related to the Creosote/Fuel Oil Area FS alternatives and the Creosote/Fuel Oil Area DCA consider all seven alternatives. The attached documents are:

1. Revised text for the FS section on Alternative 7 (MS Word)
2. A draft summary figure showing the proposed excavation extents for Alternative 7 (PDF)
3. Updated cost table for Alternative 7 (MS Excel), and
4. A revised DCA scoring matrix with the changes made to the Ecology provided DCA scoring shown in red text (MS Excel)

Regarding the Alternative 7 updated cost estimate; the costs do not include any site improvements. Cost for building demolition and partial repair necessary to conduct the proposed remediation actions are included. Additional details are provided below for your consideration as you review the cost analysis. These details are provided to you to support the cost analysis review; it seems like too much details for inclusion in the RI/FS report.

> Shoring Costs: The shoring costs include installation of a sheet pile wall and required lateral bracing. These are based on square footage of the installed sheet pile wall. To provide some lateral support and reduce the amount of water that must be pumped during the excavation the sheet piles should extend at least twice as deep as the planned excavation. A sheet pile wall, 20 feet deep, was used to estimate costs for an excavation 9 feet deep. Costs for sheet piling that we typically use range from $65 to $75/sq foot of installed wall. A cost of $75/sq foot of installed wall was used in the estimate to account for lateral bracing which will likely be required.
>
> Building Demolition Area: The footprint of the demolition will extend beyond the limits of the excavation to facilitate equipment access and the installation of the 20-foot long sheet piles. The limits of the demolition must also consider the existing load bearing points of the structure. The demolition must extend to these load bearing structural elements or temporary walls and bracing must be constructed. The exact limits of the demolition will be based on the final outlines of the excavation (which in turn will be determined by remedial design phase Geoprobe/well installation work).
>
> Partial Building Repair Costs: The cost estimate for Alternative 7 includes $1M cost for partial building reconstruction. Partial demolition of the main manufacturing building and some building reconstruction is necessary for completion of the selected remedial action. Partial building reconstruction activities are not considered site development and therefore are considered an eligible cost per MTCA (Chapter 173-322A WAC). We will consider the applicability of the final determination detailed in the Preliminary Draft Rule for Sections 350, 360, and 370 upon its incorporation into MTCA as law.
>
> Soil Disposal Rates: For the cost estimate for Alternative 7, it is assumed that 10% of the excavated soil from the saturated soil zone could contain product resulting in total PAH concentrations above 1% and would be considered a Persistent Waste, increasing handling and disposal costs.

Please give me a call once you have time to review these documents and the prior submittals. We look forward to discussing the various pieces we have provided before assembling the revised draft RI/FS report.

Let me know if you have any questions.

Thank you,
Scott

1.1.1.1 ALTERNATIVE 7: HOTSPOT SOIL REMOVAL & BIO

Alternative 7 includes excavation and off-site disposal of contaminated soil on-property to 9 feet bgs, bioremediation treatment for deeper on-site groundwater and shallow and deeper off-property groundwater, and short-term institutional controls (Figure 8.4.1.1-c). This excavation will address a majority of the high concentration soil impacts at depths where direct exposure is most likely and will reduce potential exposures through vapor intrusion and worker contact.

To support decision making regarding the extent of the proposed soil excavation a series of 10 monitoring wells and 30 temporary Geoprobe points will be installed during the remedial design phase. Monitoring well and Geoprobe borings will also be used for geotechnical testing to assess excavation shoring and dewatering system design. Pilot testing of the Bio system will also be performed during the remedial design phase. To minimize logistical difficulties, pilot testing will be performed on-property for the shallow and deeper zones, even though some of the shallow soils will be subsequently excavated. As described in Alternative 2, pilot testing will require approximately one year to complete. During this time designs for the building partial demolition and repair, shoring, and excavation activities will be completed.

Excavation of contaminated soil will proceed after the completion of the Bio pilot testing. Site conditions could easily lead to flowing sands that could quickly destabilize a shored excavation. Even using sheet piling to reduce water infiltration will have reduced effectiveness because there is no significant fine-grained unit that the sheet piling can key into that will reduce vertical groundwater flow through the sandy soils. Additional data will be collected during the Cleanup Action Plan phase to support a detailed design of the shoring system necessary for soil removal to 9 beet bgs. Based on available site information, the shoring system is likely to include a robust dewatering system to depress the water table outside of the excavation to below the target depth and sheet piling or a reinforced bentonite concrete wall to a depth of at least 20 feet bgs with lateral bracing or tie-backs. This level of effort will be required to protect structures, roadways, and utilities and to allow for the excavation of the impacted soils.

The excavation will likely proceed by sections, with shorter sections along the sheet pile wall being excavated first. The wall would be braced during this phase until clean soil is backfilled and compacted behind the wall. Once the wall has been braced with clean backfill, interior cells can then be excavated.

This work will require that a portion of the existing main manufacturing building be demolished. The footprint of the demolition will extend beyond the limits of the excavation to facilitate the installation of the 20-foot long sheet piles. The limits of the demolition must also consider the existing load bearing points of the structure. The demolition would extend to these load bearing structural elements otherwise temporary walls and bracing would be required. Demolition of the building will require the potential abatement of ACM and/or lead based paint.

It is expected that the shoring method (sheet pile or wall) will reduce the amount of water that must be pumped to capture groundwater in the excavation. Enough data does not exist at this point to design water handling systems, but it is assumed for cost estimating in this report that the system will operate at approximately 100 gpm to control water in the excavation. The extent of the excavation will be based on existing analytical data supplemented with additional investigation described above. The approximate extent of the excavation is shown on Figure 8.4.1.1-f.

For this report analysis, it is assumed that soils to a depth of 3 feet will be clean overburden. Separating clean from impacted soils during the excavation of the saturated zone will be difficult without groundwater depression. For this report cost estimate, it is assumed that 10% of the excavated soil from the saturated soil zone will contain product resulting in total PAH concentrations above 1% and would be considered a Persistent Waste, increasing handling and disposal costs.

The excavation will be backfilled with clean stockpiled overburden and imported granular fill. The soil will be placed and compacted to allow for the reconstruction of the building. Due to the prolonged disruption and required closures that would be necessary, excavation would not include soil beneath West Marine View Drive or BNSF property.

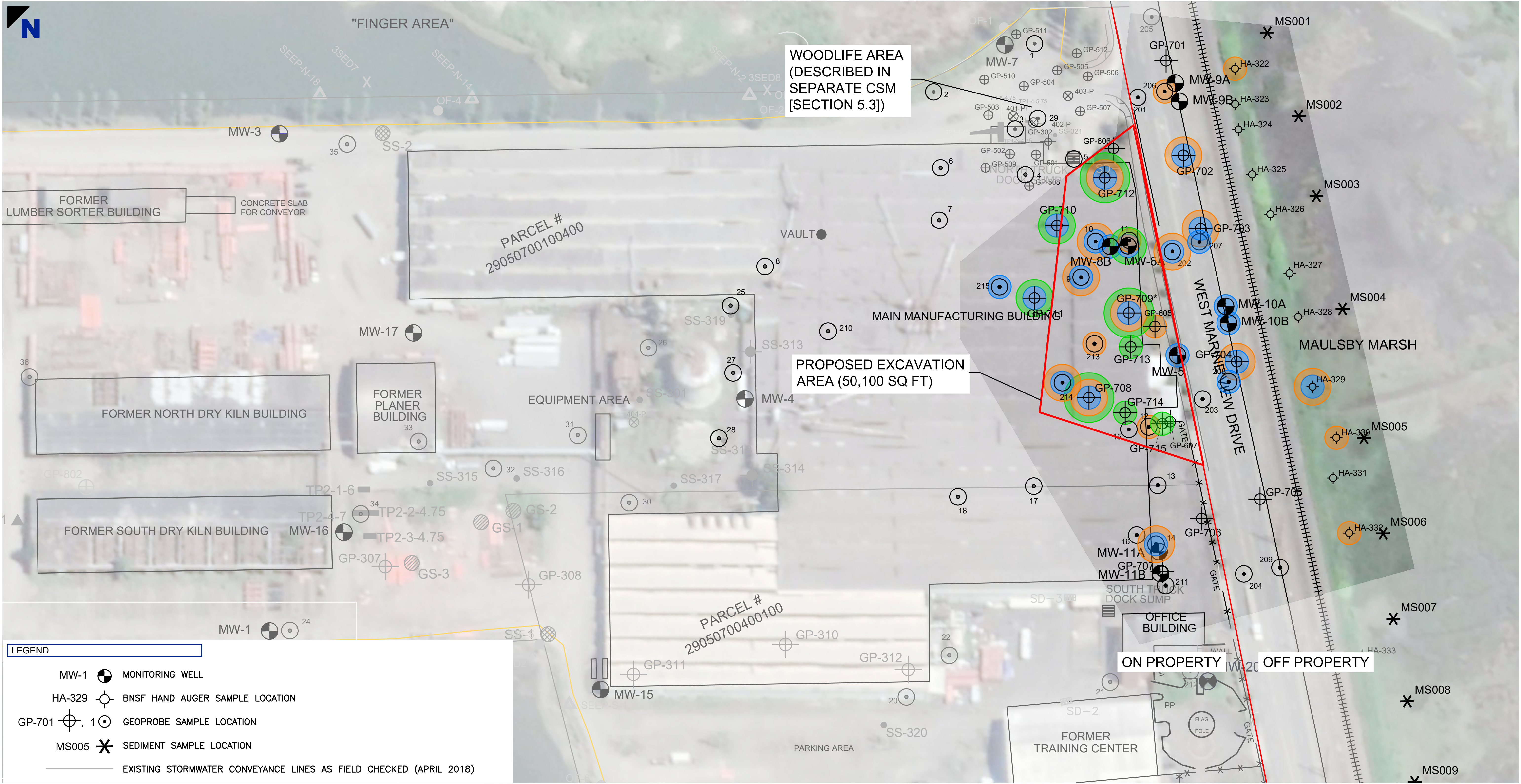
After completion of the backfilling and any removal of the sheet piling, portions of the building would be rebuilt. As portions of the existing building in the area of the excavation have already failed, it is unlikely that the entire footprint of the building will be reconstructed. For cost estimating purposes it is assumed that minor portions of the building will be reconstructed in conjunction with "sealing in" the demolished edges of the building.

Excavation of contaminated soil is estimated to take up to a year, including building demolition, shoring installation, phased excavation, backfilling and testing, and partial building reconstruction following the removal activities.

Performance groundwater monitoring will be performed semiannually for 5 years wells and annually for 5 years at 10 wells to evaluate reductions in concentrations in groundwater.

Deeper on-property impacts, and shallow and deep off-property impacts will be addressed through a Bio system as described in Alternative 2, and as applicable.

Short-term institutional controls will be completed as described in Alternative 2.



LEGEND

MW-1	MONITORING WELL
HA-329	BNSF HAND AUGER SAMPLE LOCATION
GP-701, 1	GEOPROBE SAMPLE LOCATION
MS005	SEDIMENT SAMPLE LOCATION
—	EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
🟦	GROUNDWATER EXCEEDANCE OF NAPHTHALENE PCL (BASED ON VAPOR INTRUSION)
🟧	SOIL EXCEEDANCE OF cPAH PCL (BASED ON DIRECT CONTACT)
🟩	SOIL GAS EXCEEDANCE OF NAPHTHALENE PCL

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 115 230 345'

SLR

JELD-WEN/FORMER NORD DOOR FACILITY
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
2020 REVISED RI/FS REPORT

Drawing
CREOSOTE/FUEL OIL - ALTERNATIVE 7

Date	August 2020	Scale	AS SHOWN
File Name	SW_NORD_NTL POLE_ALT 7	Project No.	108.00228.00061

Fig. No.
8.4.1.1-f

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Creosote and Fuel Oil Area - Alternative 7

Hotspot Soil Removal (on-property) and Bioremediation on- and off-property

Excavation and off-site disposal of contaminated on-property soil to 9 feet bgs and Bioremediation (Bio) on- and off-property

Remedy Components:

1 Construction contractor mobilization
2 Install Monitoring wells and Geoprobes
3 Perform Bio pilot testing on property
4 Demolish portions of the main manufacturing building for access to impacted soil for excavation
5 Install sheet-pile shoring or (other methods) to allow for soil excavation
6 Excavation of shallow soils to a depth of 9 feet below grade, hauling and off-site disposal
7 Building demolition, soil excavation, backfill, compaction, slab replacement, and partial building replacement.
8 Install Bioremediation system for deep on-property impacts and shallow and deep off-property impacts
9 Operate Bioremediation System for 5 years
10 Construction Management
11 Short-term institutional controls to restrict exposure to soil/remediation efforts

Primary Assumptions

1 On-property soil excavation is estimated at 16,700 bcy (9 feet depth, 50,000 square feet)
2 Building removal 20 feet back from excavation for access (57,000 square feet)
3 Additional assessment, bioremediation pilot testing set-up, perform pilot testing for one year
4 ACM in building is only in roofing
5 Building demolition, shoring installation, excavation, backfilling, and partial building replacement will require 1 year to complete followed by Bioremediation
6 3 feet of clean overburden, 10% of impacted soil requires special disposal
7 150 cfm AI, 240 cfm SVE, 10,000 lb carbon consumed, 40 gpm NNS (described in Alternative 2)
8 Two injections of NNS at 125,000 lbs each
9 Groundwater sampling of 10 wells for 10 years (5 years semi-annually, 5 years annually)
10 Institutional controls restricting soil exposure and soil management plan (off-property)

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost	
REMEDIAL ACTION						
Mobilization						
Mobilization	est	1	$50,000	$50,000		
					$50,000	
Monitoring Well and Geoprobe installation						
Install monitoring wells	each	10	$4,000	$40,000		
Install Geoprobes	est	1	$40,000	$40,000		
Lab and Reporting	est	1	$20,000	$20,000		
					$100,000	
Site Controls / Institutional Controls (off-property)	est	1	$20,000	$20,000		
					$20,000	
Excavation						
Demolish building	sq ft	57,000	$5	$285,000		
Building disposal	sq ft	57,000	$2.50	$142,500		
Well abandonment	ea	3	$2,000	$6,000		
Shoring installation	sq ft	18,000	$75	$1,350,000		Includes sheet pile, bracing, pile removal
Dewatering system	est	1	$100,000	$100,000		
Relocation of utilities in excavation area	est	1	$200,000	$200,000		Sewer, water, and high-pressure natural gas near excavation area
Excavation	bcy	16,700	$6	$100,200		
Disposal 3 to 9 feet regular waste (90%)	ton	14,028	$55	$771,540		Soil from 3 to 9 feet (2/3 total volume bank cubic yards [bcy]), 1.4 tons per bcy, 90% soil excavation
Disposal 3 to 9 feet persistent waste (10%)	ton	1,559	$400	$623,467		Soil from 3 to 9 feet (2/3 total volume bank cubic yards [bcy]), 1.4 tons per bcy, 10% soil excavation
Place and compact clean overburden	bcy	5,566	$5	$27,831		
Provide, place, and compact clean fill	bcy	11,133	$25	$278,333		
Partial Building reconstruction	LS	1	$1,000,000	$1,000,000		
					$4,884,871	
Bio Pilot testing						
Install wells	each	4	$6,000	$24,000		
Install vertical recirculation well	each	1	$8,000	$8,000		
Testing Labor	month	6	$12,000	$72,000		
Equipment Rental and setup	month	6	$10,000	$60,000		
NNS chemicals	lbs	2,000	$33	$66,800		
Temporary power supply	LS	1	$10,000	$10,000		
Carbon vessels	each	2	$4,000	$8,000		
Install post test borings	LS	1	$10,000	$10,000		
Lab and Reporting	LS	1	$40,000	$40,000		
					$298,800	
Bioremediation System						
AI wells	each	19	$3,000	$57,000		
NNS wells	each	9	$4,000	$36,000		
Vertical mixing wells	each	5	$8,000	$40,000		
Submersible pumps and headworks	each	10	$5,000	$50,000		
Trenching and Piping	feet	2,000	$110	$220,000		
Road Bore	LS	1	$40,000	$40,000		
Blowers and Enclosure	LS	1	$130,000	$130,000		
NNS addtion system	LS	1	$60,000	$60,000		
NNS chemicals	lbs	250,000	$3.40	$850,000		
NNS addition labor	LS	2	$35,000	$70,000		
Electrical Service	LS	1	$40,000	$40,000		
					$1,593,000	
Decommissioning						
Monitoring Well Decommissioning[1]	each	42	$2,000	$84,000		
					(See NPV)	
Subtotal					$6,946,671	
Project Management	6%				$416,800	
Design and permitting	10%				$694,667	
Construction management	8%				$555,734	
Taxes	10%				$694,667	
Contingency	25%				$1,736,668	
Remedial Action Subtotal (Rounded to nearest $10,000)					**$11,050,000**	
Monitoring and Maintenance						
Semi-annual groundwater monitoring and sampling (yr 1-5[1])	yr	5	$10,000	$50,000		
Groundwater monitoring and sampling - annual (yrs 6-10[1])	yr	5	$5,000	$25,000		
Annual reporting (year 1-2)[1]	yr	2	$10,000	$20,000		
Annual reporting (yrs 3 - 10)[1]	yr	8	$4,000	$32,000		
Bio systems O&M, electrical, equipment repair	yr	5	$32,000	$160,000		
5 year review report (every 5 yrs)[1]	yr	2	$12,000	$24,000		
Subtotal NPV (see below)					$381,000	
Taxes	10%				$38,100	
Contingency	20%				$76,200	
Monitoring and Maintenance Subtotal (Rounded to nearest $10,000)					**$500,000**	
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to nearest $100,000)					**$11,600,000**	

[1] Year 1 value shown

Year	Monitoring	O&M	Carbon	Decom	Reporting	
SUM NPV:	$70,523	$153,168	$19,377	$74,476	$63,534	**$381,000**
1	$0	$0	$2,000	$0	$0	
2	$10,000	$32,000	$6,000	$0	$10,000	
3	$10,000	$32,000	$6,000	$0	$10,000	
4	$10,000	$32,000	$4,000	$0	$4,000	
5	$10,000	$32,000	$2,000	$0	$4,000	
6	$10,000	$32,000	$0	$0	$12,000	
7	$5,000	$0	$0	$0	$4,000	
8	$5,000	$0	$0	$0	$4,000	
9	$5,000	$0	$0	$0	$4,000	
10	$5,000	$0	$0	$0	$4,000	
11	$5,000	$0	$0	$84,000	$12,000	

Remedial Action Component	Units	No. of Units	Unit Cost	Cost	Total Cost

Notes:

Discount rate = 1.1%

OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)

Total NPV shown is rounded to nearest $1,000

Table 10.1-1
Creosote/Fuel Oil Area
Disproportional Cost Analysis Matrix

Criterion	Weighting	WAC Language	Scoring Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
				Sub-Slab Depressurization (SSD), Engineering Control (EC), Institutional Controls (IC)	In-Situ Bioremediation (ISB), SSD, MNA, EC, IC	In-Situ Chemical Oxidation (ISCO), SSD, MNA, IC	Soil Removal, ISB, MNA, IC	Thermal Treatment (TT), SSD, EC, IC	In-Situ Soil Stabilization/Solidification (ISS), TT, IC
Protectiveness	30%	Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.	Alternative 1 meets the MTCA threshold requirements but does not meet the other requirements (permanent solution to maximum extent practicable and reasonable restoration timeframe); accordingly, the benefit score to Cost Ratio is not presented for Alterna health and the environment by reducing the existing risks. Alternative 4 and 7 score highest due to the greater degree of certainty associated with removal and the quicker risk reduction. Alternative 4 scores higher than 7 because of more contaminant mass ren timeframe. Alternative 6 reduces the mobility of contaminants but leaves them in place and removes contamination through thermal treatment from off property areas. Alternatives 2, 3, and 5 treat the majority of contamination at the Site with different degree o with thermal treatment (Alternative 5) scoring relatively higher due to being more effective and with a shorter restoration timeframe. Alternative 2 has a lesser degree of certainty and requires more active treatment time than alternative 5 and therefore scores addresses on property contamination but does not effectively address off property contamination and therefore scores the lowest.						
			Score:	1.0	4.0	3.0	10.0	6.0	7.0
Permanence	20%	The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.	Alternatives are scored based on permanent removal of contaminants with higher scoring provided for alternatives that permanently reduce toxicity, mobility or volume. Alternative 1 meets the MTCA threshold requirements but does not meet the other requireme extent practicable and reasonable restoration timeframe); accordingly, Alternative 1 is scored low for permanence and the benefit score to Cost Ratio is not presented for Alternative 1. Alternatives 4, 5 and 7 permanently remove or treat the majority of contamin removes most on-site contamination permanently and score the highest. Alternative 4 scores slightly higher than 7 because of more soil mass removal resulting in a more permanent solution. Alternative 5 provides more complete treatment of the volatile and se scores the next highest. Alternatives 2 and 6 also provide treatment or immobilize contamination but Alternative 2 has less degree of certainty regarding effectiveness on higher ring PAHs. Alternative 6 scores higher due to the thermal treatment of the off propert it leaves contamination in the off property soils.						
			Score:	1.0	4.0	3.0	9.0	7.0	6.0
Long-Term Effectiveness	20%	Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.	Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex & less reliable treatment technologies and technologies requiring longer durations generally ar preferences for (in order) recycling, destruction/detoxification, immobilization/solidification, off-site disposal, isolation/containment, and institutional and engineering controls. Alternative 1 meets the MTCA threshold requirements but does not meet the reasonab in MTCA; accordingly, Alternative 1 is scored low for Long-Term Effectiveness and the benefit score to Cost Ratio is not presented for Alternative 1. Alternative 4, 5, and 7 have similar higher scores for long term effectiveness than other alternatives. Alternative 5 complete destruction of hazardous substances on Site but some degree of uncertainty exists whether this Alternative will be successful. Alternative 4 and 7 rely on off-site disposal which is a mature and proven technology used at most sites with Alternative 4 sco less magnitude of residual risk remaining on-site. Alternative 6 also scores very high due to immobilization and destruction technology but suffers from complexity. Alternative 2 destroys contamination over a longer period that requires longer monitored natu destroys contaminants quicker than Alternative 2 but it is not practical for off-property contamination and therefore receives the lowest score.						
			Score:	2.0	4.0	3.0	9.0	8.0	7.0
Management of Short-Term Risk	10%	The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.	Scoring for management of short term risks uses a relative scale to evaluate construction risks to human health and safety; larger more complex projects are considered to carry greater risk than simpler small projects. Technology-specific risks have been consi temperature related risks; excavation has construction, cave-in, bottom heave, and shoring risks; and ISCO has chemical handling risks). Alternative 1 meets the MTCA threshold requirements but does not meet the other requirements (permanent solution to maxin restoration timeframe); accordingly, the benefit score to Cost Ratio is not presented for Alternative 1. Alternative 2 includes modest installation risks for the enhanced bioremediation system (pumps and piping) and operates for a longer period of time (cumulative Alternative still receives a higher score compared to alternatives with more construction risk. Alternative 3 (ISCO treatment) poses an elevated risk of worker injury handling and injecting high-ionic strength solution, as well as potential risk to near-surface utilities some short-term risks that include high risks of worker injury that may include excavation failures, potential burns or damage associated with high pressure steam, injuries associated with building demolition, and/or damage to near surf						
			Score:	9.0	8.0	7.0	4.0	4.0	4.0
Technical and Administrative Implementability	10%	Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.	Scoring evaluates the overall difficulty of implementation for each of the proposed alternatives. Alternative 1 meets the MTCA threshold requirements but does not meet the other requirements (permanent solution to maximum extent practicable and reasonable the benefit score to Cost Ratio is not presented for Alternative 1. Alternatives 2, 3, & 5 use technologies that have been demonstrated to be effective for conditions observed at the Site and comprise projects of moderate size and complexity. Alternative 2 requires 3 requires chemical amendments that have become more difficult to procure and handle at the scale required for treatment. Alternative 5 also uses mature technology that has demonstrated efficacy at the Site, but may require a greater degree of complexity to and 7 represent proven technology (frequently occurring) with available off-site facilities suitable for disposal. Alternative 7 is less invasive than Alternative 4 and, therefore, scores slightly higher. Alternative 4 and 6 require extensive, risky construction an						
			Score:	9.0	8.0	7.0	4.0	5.0	4.0
Consideration of Public Concerns	10%	Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.	Alternatives were scored based on public concerns related to cleanup projects in the Port Gardner Bay area. Alternative 1 is the least change to the Site and least disruptive alternative. Alternative 1 meets the MTCA threshold requirements but does not meet the benefit score to Cost Ratio is not presented for Alternative 1. Alternative 4 and 7 offer removal of contamination with impacts associated with active construction, hauling to off-site facilities, and additional traffic. Alternatives 2 and 5 offer active cleanup of contan public impact, however, the public may be skeptical about biological treatment. Alternative 6 scores lower than previous alternatives due to greater public impacts including keeping contamination in place, extended construction schedules and prolonged disrupt Property. Alternatives 3 scores the lowest based on public concern about injection of chemicals in groundwater and leaves contamination off property.						
			Score:	4.0	5.0	3.0	7.0	6.0	4.0
			Total Composite Benefit Score:	3.1	4.9	3.8	8.1	6.3	5.9
			Unit Cost (Dollars per Composite Benefit Score Increment):	$388,000	$1,123,000	$2,079,000	$1,840,000	$1,874,000	$2,882,000
			Cost (Millions of Dollars):	$1.2	$5.5	$7.9	$14.9	$11.8	$17.0
			Benefit Score to Cost Ratio	~~2.58~~	0.89	0.48	0.54	0.53	0.35

September 3, 2020; Anchor Memo to Ecology on Revised Marine Alternatives and Benefit Scoring Rationale

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ANCHOR QEA

Memorandum

September 3, 2020

To: Susannah Edwards and Pete Adolphson, Washington State Department of Ecology

From: Nathan Soccorsy, Jason Cornetta, and John Laplante, PE, Anchor QEA, LLC

cc: Bonnie Basden, JELD-WEN Inc.

Re: JELD-WEN / Former Nord Door Facility RI/FS
Revised Marine Alternatives and Benefit Scoring Rationale

Purpose

This memorandum presents the narrative revisions and the updated benefit scoring proposed for the evaluation of marine alternatives and disproportionate cost analysis (DCA) to be included in the *Final Draft Remedial Investigation/Feasibility Study (RI/FS) for the JELD WEN/Former Nord Door Facility* that is in preparation. The memorandum summarizes the Ecology and Anchor QEA revised benefit scores for the marine alternatives, along with Anchor QEA's narrative scoring rationale proposed for integration into the Final Draft RI/FS. The areas where the scores differ are identified to facilitate further technical discussions and resolution necessary to finalize the Final Draft RI/FS.

Background

Anchor QEA and SLR Consulting submitted the 2020 Revised Draft RI/FS (Draft RI/FS) to Ecology on April 30, 2020. Ecology provided comments on the Draft RI/FS including marine components in a letter dated June 19, 2020. Ecology's comments included switching from a quantitative to a qualitative evaluation and eliminating certain weighting elements included in the Draft RI/FS.

As part of the comments, Ecology rescored each alternative in the DCA using the updated qualitative approach and created a new hybrid alternative. The revised scores provided with the Ecology comments were not accompanied by a detailed technical rationale.

Ecology requested that the detailed evaluation and comparison of marine alternatives be rewritten after revising the DCA to present a simplified qualitative evaluation in lieu of the quantitative evaluation initially presented. Subsequent to Anchor QEA receiving the comment letter dated June 19, 2020, Ecology provided further direction on streamlined alternatives to be retained in the Final Draft RI/FS. Table 1 compares the Draft RI/FS alternatives to what will be retained in the Final Draft RI/FS. Note that alternatives have been renumbered as shown in Table 1.

Table 1
Changes to the Evaluated Alternatives for the Draft RI/FS and Final Draft RI/FS Submittals

Draft RI/FS	Retained in Revised RI/FS	Final Draft RI/FS
M8: Full Removal	Yes	M7: Full Removal (All SMAs); no changes
M7: Removal Focus	Yes	M6: Removal Focus (All SMA-3); no changes
M6.5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new*	Yes (Added by Ecology)	M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative
M6: Removal Focus	Yes	M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap; no changes
M5: Targeted Removal Focus – Southern Areas	Yes	M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3); no changes
M4a: Targeted Removal Focus – North Inlet Area (2-foot removal)	No	N/A
M4b: Targeted Removal Focus – North Inlet Area (4-foot removal)	No	N/A
M3: Capping Focus (soft shoreline)	No	N/A
M2: Capping Focus (armored shoreline)	Yes	M2: Engineered Cap On-Grade (All SMA-3); no changes
M1: Source Control and Natural Recovery	Yes	M1: Source Control and Natural Recovery; no changes

Note:
* Not included in Anchor QEA Draft RI/FS.

During the process of rewriting the detailed evaluation and comparison of marine alternatives, Anchor QEA has identified areas of agreement on the scoring and rationale, as well as some areas of technical disagreement. For areas of disagreement, Anchor QEA has prepared a technical basis for the proposed scoring, in order to focus subsequent technical discussions.

DCA Evaluation Criteria

This section presents the updated Final Draft RI/FS text that is proposed to be included in the detailed evaluation and comparison of marine alternatives (Section 10.2), as well as the revised scoring proposed for each of the alternatives and evaluation criteria. Both the Ecology and Anchor QEA scores are included to inform future collaborative discussions.

The following presents our proposed revised text for Section 10.2 of the Final Draft RI/FS, and includes commentary with tables comparing Anchor QEA’s proposed scoring with Ecology’s scoring.

Protectiveness

MTCA defines protectiveness as:

> "Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality." (WAC 173-340-360(3)(f)(i))

Anchor QEA evaluated the protectiveness of each alternative based on its effectiveness in reducing risks to human health and the environment by achieving cleanup standards at the point of compliance (i.e., site-specific bioactive zone of 0 to 1 foot below mudline). Cleanup Levels (CUL) address human health and environmental protection end points. In sediments, human health remediation levels (RELs) are set to achieve a surface-weighted average concentration CUL, while benthic protection is required on a point-by-point CUL basis (benthic protection criteria in accordance with the Sediment Management Standards), after construction.

Alternative M1 does not include any active remediation and therefore does not meet the MTCA Threshold Criteria. The net sedimentation rate is too low to predict adequate recovery within the 10-year post-construction restoration time frame. Alternative M1 is retained for completeness but is not scored or further considered for selection.

At the highest level, Alternatives M2 through M7 remedial technologies (i.e., removal, partial removal with engineered capping, and engineered capping) entirely replace the existing bioactive zone and could be considered equally protective at achieving the remediation goal immediately following construction. However, modifying factors (such as Ecology's preference for removal) can be considered qualitatively to adjust scores for the purpose of the DCA. Removing all sediment exceeding CULs and RELs (beyond the point of compliance) provides the greatest reduction of risk to human health and the environment. As a result, Alternative M7 is scored the highest for protectiveness because it targets full removal of sediment throughout the marine areas of the Site (even beyond the point of compliance) exceeding CULs.

Alternatives M6 and M5 were scored the next highest because they both reduce existing risks through removal of contaminant mass. Although Alternatives M6 and M5 do not result in complete removal, they reduce future risks by including complete removal in SMA-3 (Alternative M6) or by presumptively including additional removal in a portion of SMA-2[1] (Alternative M5). Alternatives M4 and M3 were scored progressively lower than Alternatives M6 and M5 based on reduced contaminant mass removal volumes. Alternative M2 was scored lowest. Alternative M2 is equally as

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[1] The extent of SMA-2 removal discussed in Alternative M5 will be determined in remedial design.

protective as alternatives that include removal because it achieves human health and ecological cleanup standards throughout the marine areas of the Site (i.e., CULs within the top 1 foot of sediment on a SWAC basis); however, it is scored lowest based on potential future risk resulting from leaving sediment above CULs.

Commentary on Protectiveness Scoring

Anchor QEA ranks the alternatives in the same order as Ecology; however, the proposed scores for alternatives with less or no removal are scored slightly higher than Ecology based on the rationale provided in Table 2.

Table 2
Comparison of Ecology and Anchor QEA Benefit Scoring for Protectiveness

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7: Full Removal (All SMAs)	10.0	10.0	Agreement, complete removal in all SMAs scores 10: • Achieves Cleanup Standards immediately following construction. • Does not leave sediment above CULs (i.e., risk of not meeting Cleanup Standards in the future) in SMA-1, 2, or 3.
M6: Removal Focus (All SMA-3)	9.0	9.0	Agreement, complete removal in SMA-3 scores 9.0: • Achieves Cleanup Standards immediately following construction. • Does not leave sediment above CULs in SMA-3 • Leaves sediment above CULs in SMA-1 and SMA-2. • Although removal quantity is significantly lower under M6 than M7, the highest concentrations (SMA-3) are still removed under M6.
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	9.0	9.0	Agreement, expanded partial removal in SMA-3 and partial removal in SMA-2 scores 9.0: • Achieves Cleanup Standards immediately following construction. • Leaves sediment above CULs in SMA-1, SMA-2, and SMA-3. • Does not remove all sediment above CULs in SMA-3 but achieves complete removal in portions of SMA-3 (south shore and knoll) and removes additional sediment in SMA-2 (knoll). • Removal quantity is not significantly different from M6.
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	7.0	8.0	Score reduction between M4 and M5 should be similar to the score reduction between M7 and M6/M5: • Achieves Cleanup Standards immediately following construction. • Leaves sediment above CULs in SMA-1, SMA-2, and SMA-3. • M4 excludes an assumed additional 0.35 acre of removal in SMA-2, and has a 2-foot vs. 4-foot removal in M5 for the SMA-3 southern shoreline area.

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3)	6.5	7.5	Agree with the same relative score difference between M3 and M4: • Achieves Cleanup Standards immediately following construction. • Leaves sediment above CULs in SMA-1, SMA-2, and SMA-3. • The difference between M3 and M4 is that M3 does not include 2 feet of removal in the knoll and inlet areas of SMA-3.
M2: Engineered Cap On-Grade (All SMA-3)	4.0	6.0	Score reduction between M2 and M3 should be proportional to the score reduction between M3 and M4: • Achieves Cleanup Standards immediately following construction. • Leaves sediment above CULs in SMA-1, SMA-2, and SMA-3. • The difference between M2 and M3 is that M2 does not include 2 feet of removal in the south shoreline area of SMA-3.
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

Permanence

MTCA defines permanence as:

> "The degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated." (WAC-173-340-360(3)(f)(ii))

Anchor QEA evaluated the permanence of each alternative based on its effectiveness at reducing the toxicity, mobility, or volume of contaminants in the marine areas of the Site. When considering the permanence of removal, partial removal with engineered capping, and engineered capping only alternatives, alternatives that incorporate full or partial removal reduce the volume of hazardous substances, and alternatives that incorporate engineered capping reduce the mobility of hazardous substances. Both removal and engineered capping technologies are considered permanent; however, engineered capping requires long-term monitoring and potential maintenance to ensure permanence. As such, removal scores higher for permanence than engineered capping. Alternative M7 is, therefore, scored the highest for permanence because it targets full removal of sediment exceeding CULs throughout the marine areas of the Site, providing the highest reduction in contaminant volume.

Alternatives M6 and M5 were scored the next highest because they provide the next highest reduction in contaminant volume (through removal) and address contaminants remaining in the marine portion of the Site above CULs with physical and chemical isolation via engineered capping (i.e., cap design addresses climate change and seismic forces). Alternatives M4 and M3 were scored progressively lower than M6 and M5 based on reduced removal volumes. Alternative M2 was scored lowest because the contamination is addressed in the other alternatives with removal, while with Alternative M2 the contaminant volume at the Site is unchanged.

Commentary on Permanence Scoring

Anchor QEA ranks the alternatives in the same order as Ecology; however, Ecology has indicated significant score reductions for alternatives that include engineered capping. Anchor QEA's proposed scores for alternatives with less or no removal are slightly higher than Ecology's based on the rationale provided in Table 3. This is an area of technical disagreement. Not only are engineered caps designed to function in perpetuity, JELD-WEN would be required to monitor and maintain the caps, further ensuring the permanence of the remedy. However, Ecology is considering monitoring and maintenance requirements a significant risk when assigning scores to engineered capping.

Table 3
Comparison of Ecology and Anchor QEA Benefit Scoring for Permanence

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7 – Full Removal (All SMAs)	9.75	9.75	Agreement, complete removal in all SMAs scores 9.75: • Lowest potential for future exposure. • Only excavation residuals remain following construction.
M6: Removal Focus (All SMA-3)	9.0	9.0	Agreement, complete removal in SMA-3 scores 9.0: • Low potential for future exposure. • Significant contaminant mass removal (SMA-3). • SMA-1 and SMA-2 do not have reduced contaminant volume following construction.
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	9.0	9.0	Agreement, expanded removal in SMA-3 and partial removal in SMA-2 scores 9.0: • Low potential for future exposure. • Does not remove all contaminant mass in SMA-3, but is the only alternative that removes additional contaminant mass in a portion of SMA-2.
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	8.0	8.0	Agreement, partial removal scores 8.0: • Materials exceeding CULs remain in SMA-3. • Monitoring and maintenance of caps is necessary to prevent future exposure.
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (SMA-3 in Inlet)	6.5	7.0	Should be scored more proportional relative to the differences from M4: • Same potential for future exposure as M4; capped concentrations would remain throughout SMA-3. • Does not remove all contaminant mass in SMA-3 (slightly less than M4). • The difference between M3 and M4 entails a relatively minor reduction in removal volumes and therefore the scores between M4 and M3 should be closer to one another.

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M2: Engineered Cap On-Grade (All SMA-3)	3.0	6.0	Should be scored more proportional relative to the difference from M3 given the physical and chemical isolation: • Same potential for future exposure as M3 and M4; capped concentrations would remain throughout SMA-3. • Does not remove contaminant mass in SMA-3. • Capping has been demonstrated to be effective on sediment cleanup projects in Puget Sound and throughout the United States. The technology has been approved by USEPA and is designed using rigorous engineering methods. The significant reduction in score between M3 and M2 is not justified and implies inherent flaws in engineered capping that are not borne out in experience or in guidance documents including SCUM.
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

Long-Term Effectiveness

MTCA defines effectiveness over the long term as:

> "Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes" (WAC 173-340-360(3)(iv))

The long-term effectiveness was evaluated based on the certainty that each alternative would be successful throughout the time frame that hazardous substances would be expected to remain at the Site in concentrations exceeding CULs, with considerations for climate change and seismic events. Alternative M7 is scored the highest for long-term effectiveness because it targets full removal of sediment above CULs throughout the marine areas of the Site, providing the highest degree of certainty regarding the success of the alternative. Alternatives M6 and M5 were scored the next highest because they provide the next highest reduction in contaminant volume and, therefore, the degree of certainty regarding the success of the alternative. Alternatives M4 and M3 were scored progressively lower than M6 and M5 based on reduced removal volumes. Alternative M2 was scored lowest because sediments exceeding CULs remain on Site (although isolated beyond the point of compliance via engineered capping).

Climate change vulnerabilities relating to increased occurrence of severe storms (winds, waves, increased precipitation, and flooding) render the long-term effectiveness uncertain for alternatives where contamination is left in place (i.e., capping). Remedial designs for engineered caps would need to consider climate change parameters (i.e., increasing sea level and storm intensity), which have some degree of uncertainty over the life of the design.

In addition to climate change, vulnerability relating to earthquakes is also a consideration for the long-term effectiveness of alternatives that leave contamination in place. Marine contaminants at the Site are located on relatively flat intertidal zones and within a larger mudflat area that is not impacted by marine contaminants at the Site. Engineered caps placed on the flat intertidal sediments may experience some cap thinning or lateral cap movement during an earthquake; however, deformed or damaged caps can be easily repaired, and engineered caps can be designed to consider earthquake forces.

A more detailed evaluation of the potential effects of earthquakes and erosion would be conducted during design as warranted. Because the marine tideflat area SMAs are already subject to tidal inundation, they have limited vulnerability related to sea level rise. Deeper water is more protective of engineered caps because erosive forces are reduced.

Commentary on Long-Term Effectiveness Scoring

Anchor QEA ranks the alternatives in the same order as Ecology; however, as with permanence, Ecology has indicated significant score reductions for engineered capping. This is an area of technical disagreement based on the same rationale provided in the permanence section and in Table 4.

Table 4
Comparison of Ecology and Anchor QEA Benefit Scoring for Long-Term Effectiveness

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7: Full Removal (All SMAs)	10.0	10.0	Agreement, complete removal in all SMAs scores 10: • Lowest potential for future exposure or releases. • Climate change factors do not modify risk.
M6: Removal Focus (All SMA-3)	8.0	8.0	Agreement, complete removal in SMA-3 scores 8.0: • Low potential for future exposure or releases in SMA-3. • MNR in SMA-1 and EMNR in SMA-2 have some uncertainty regarding long-term effectiveness.
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	8.0	7.0	Expanded removal in SMA-3 and partial removal in SMA-2 should score 7.0: • Low potential for future exposure or releases in SMA-3. • MNR in SMA-1 and EMNR in SMA-2 have some uncertainty regarding long-term effectiveness. • Relies on proper monitoring and maintenance of cap area in the protected inlet (opposed to M6).
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	6.0	6.0	Agreement, partial removal scores 6.0: • Potential for future exposure in capped areas throughout SMA-3 is less certain due to climate change factors. • MNR in SMA-1 and EMNR in SMA-2 have some uncertainty regarding long-term effectiveness. • Relies on proper monitoring and maintenance of cap areas.
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3)	5.0	5.0	Agreement, targeted removal in the south shoreline of SMA-3 scores 5.0: • Potential for future exposure in capped areas throughout SMA-3 is less certain due to climate change factors. • MNR in SMA-1 and EMNR in SMA-2 have some uncertainty regarding long-term effectiveness. • Relies on proper monitoring and maintenance of cap areas. • The only difference between M4 and M3 is that M4 includes 2 feet of removal in the knoll and inlet areas of SMA-3.

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M2: Engineered Cap On-Grade (All SMA-3)	2.0	4.0	M2 should be more proportional to M3: • Potential for future exposure in capped areas throughout SMA-3 is less certain due to climate change factors. • MNR in SMA-1 and EMNR in SMA-2 have some potential for future exposure or releases. • Relies on proper monitoring and maintenance of cap areas. • The only difference between M2 and M3 is that M2 does not include 2 feet of removal in the south shoreline area of SMA-3. Ecology gives a 2-point score reduction between M5 and M4 (when capping is compared to removal) but applies a 3-point score reduction between M2 and M3 (when the southern shoreline area is capped on-grade rather than capped following 2-foot removal). The comparative score reduction between M3 and M2 should be similar to the reduction between M5 and M4.
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

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Short-Term Risk

MTCA defines management of short-term risk as:

> "The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks." (WAC 173-340-360(3)(f)(v))

Short-term risks are primarily associated with construction activities. Common to all active remediation alternatives, construction equipment operations result in greenhouse gas and particulate emissions, which present health risks to the adjacent community from degraded air quality. Construction itself is inherently dangerous, presenting a safety risk to workers at the Site and to the public during transportation of materials and equipment to and from the Site. To the extent that these short-term risks apply to all construction activities, the overall risk for shorter duration and less construction-intensive projects is comparatively lower than for longer duration and more intensive construction projects.

In addition to health and safety short-term risks, alternatives that include removal present risks to water quality because of potential releases associated with dredging, and to the benthic community due to short-term disruption of habitat, as well as generated dredging residuals. The magnitude of short-term water quality and sediment quality risks associated with removal alternatives is directly correlated with the volume of sediment removed. Based on these considerations, short-term risks are comparatively lower for shorter duration actions and for EMNR or engineered capping.

Alternative M2 scored highest based on smallest/shortest duration construction (no removal). Alternative M7 scored lowest based on the largest/longest duration construction. Alternatives M3 through M6 were given intermediate scores based on the relative size and duration of the active construction associated with each of these alternatives.

Commentary on Short-Term Risk Scoring

Anchor QEA ranks the alternatives in the same order as Ecology and does not have any substantive technical disagreements with Ecology's proposed scoring, as shown in Table 5.

Table 5
Comparison of Ecology and Anchor QEA Benefit Scoring for Short-Term Risk

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7 – Full Removal (All SMAs)	3.0	3.0	Agreement, complete removal in all SMAs scores 3.0 (largest/longest duration construction).
M6 – Removal Focus (All SMA-3)	5.0	5.0	Agreement, complete removal in SMA-3 scores 5.0 (large/long duration construction).
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	6.0	6.0	Agreement, expanded removal in SMA-3 and partial removal in SMA-2 scores 6.0 (moderate to large size/duration construction).
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	7.0	7.0	Agreement, partial removal scores 7.0 (moderate size/duration construction).
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3)	7.0	7.0	Agreement, targeted removal in the south shoreline of SMA-3 scores 7.0 (moderate size/duration construction).
M2: Engineered Cap On-Grade (All SMA-3)	8.0	8.0	Agreement, engineered cap on-grade in SMA-3 scores 8.0 (smallest/shortest duration construction).
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

Technical and Administrative Implementability

MTCA defines technical and administrative implementability as:

> "Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary off-site facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions."
> (WAC 173-340-360(3)(f)(vi))

Implementability expresses the relative difficulty and uncertainty of implementing the cleanup action (Section 9.3.5). This section describes both the technical and administrative implementability considerations and scoring for the marine area alternatives.

All of the technologies included in the evaluation of alternatives incorporate well established and proven methods of remediation. As a result, materials are readily available locally, and there is a pool of qualified, experienced contractors. The technical challenges and complexities associated with the proposed technologies generally include excavation in the inlet area, slope stability and shoring, and excavation in areas with deeper cuts or cuts that are farther from the shoreline where subgrade stability and access present additional challenges.

The technical challenges for Alternatives M4 and M3 are similar because they both include similar excavation and capping depths, while Alternative M6 has additional technical challenges associated with deeper removal depths in the inlet area. Alternative M7 is the most technically challenging because of large excavation footprints on tidally influenced mudflat, deepest cuts, and potential slope stability shoring requirements in the inlet.

There are also potential administrative challenges associated with the proposed technologies that could affect implementability. Administrative challenges include regulatory approvals, permitting requirements, and potential land use or navigational restrictions associated with remedial technologies (i.e., deed restriction or institutional controls). There are no difficult permitting requirements anticipated for Alternatives M2, M3, M4, M5, or M6; however, institutional controls are assumed to be required for alternatives that include engineered caps (Alternatives M2 through M5). There may be some permitting challenges associated with Alternative M7 due to the larger disturbance area. Mitigation may be required under each of the proposed alternatives.

Based of these technical and administrative challenges, Alternatives M2 and M3 were scored equally as were alternatives M4, M5, and M6. Alternatives M2 and M3 have similar technical and administrative challenges (permitting, institutional controls, and mitigation) as Alternatives M4 and M5. Alternative M6 has some additional challenges associated with deeper excavation in the inlet area; however, these technical challenges are offset by fewer administrative challenges from reduced long-term monitoring and institutional control requirements associated with capping. Alternative M7 was scored lowest based on significant technical challenges (large excavation footprints on tidally influenced mudflat, deepest cuts, slope stability shoring requirements) and permitting challenges due to a large disturbance area.

Commentary on Technical and Administrative Implementability Scoring

Anchor QEA ranks the alternatives in the same order as Ecology; however, the proposed score for the capping on-grade only (no removal) alternative is scored slightly higher than Ecology based on the rationale provided in Table 6.

Table 6
Comparison of Ecology and Anchor QEA Benefit Scoring for Implementability

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7 – Full Removal (All SMAs)	5.5	5.5	Agreement, complete removal in all SMAs scores 5.5: • Technical challenges include large excavation footprints on tidally influenced mudflat, deepest cuts, slope stability shoring requirements. • May pose permitting challenges due to large disturbance area.
M6 – Removal Focus (All SMA-3)	8.0	8.0	Agreement, complete removal in SMA-3 scores 8.0: • Technical challenges associated with deepest removal in the inlet. • Reduced long-term monitoring and maintenance requirements compared to capping alternatives (offsets technical challenges from deeper excavations). • Significant permitting difficulties not anticipated.
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	8.0	8.0	Agreement, expanded removal in SMA-3 and partial removal in SMA-2 scores 8.0: • Some technical challenges associated with shallow removal in the inlet. • Engineered cap design must function in perpetuity; will require long-term monitoring and maintenance efforts, which could require coordination with future site operations. • Significant permitting difficulties not anticipated. Caps may require institutional controls (restrictive covenants).
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	8.0	8.0	Agreement, partial removal scores 8.0: • Some technical challenges associated with removal in the inlet. • Engineered cap design must function in perpetuity; will require long-term monitoring and maintenance efforts, which could require coordination with future site operations. • Significant permitting difficulties not anticipated. Caps may require institutional controls (restrictive covenants).

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3)	6.0	6.0	Agreement, targeted removal in the south shoreline of SMA-3 scores 6.0: • Some technical challenges associated with removal on unstable intertidal subgrades. • Engineered cap design must function in perpetuity; will require long-term monitoring and maintenance efforts, which could require coordination with future site operations. • Some additional administrative challenges from monitoring or permitting caps on-grade may exist; however, if encountered would be offset by reduced technical challenges from less excavation on unstable intertidal subgrades.
M2: Engineered Cap On-Grade (All SMA-3)	4.0	6.0	Should be scored the same as M3: • Engineered cap design must function in perpetuity; will require long-term monitoring and maintenance efforts, which could require coordination with future site operations. • Some additional administrative challenges from monitoring or permitting caps on-grade may exist; however, if encountered would be offset by reduced technical challenges from less excavation on unstable intertidal subgrades. • Any permitting or monitoring challenges associated with capping on-grade, if encountered, would be similar to M3 and further offset by reduced technical challenges from eliminating excavation (no excavation on unstable subgrades, no upland stockpiling and dewatering, no off-site trucking and disposal).
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

Consideration of Public Concerns

MTCA defines consideration of public concerns as:

> "Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site." (WAC 173-340-360(3)(f)(vii))

The public involvement process under MTCA is used to identify potential public concerns regarding cleanup action alternatives. The extent to which an alternative would address those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, local businesses, and other organizations with an interest in the cleanup action. Potential impacts to cultural resources from a given remedy and potential impacts during remedy implementation are considered under this evaluation criterion. Ecology will continue to evaluate public concerns through the public involvement process as the CAP is developed.

Input from members of the community is used to shape the remedial actions with respect to timing, local or cultural considerations, and effects from disturbances including noise, light, and traffic that result from implementation methods or transportation routes. Different members of the community may have different priorities, and these priorities may or may not be aligned with the goals of the cleanup and/or the specific requirements of MTCA. Consistent with cleanup evaluations conducted by Ecology at other similar cleanup sites, preliminary consideration of public concerns for this DCA balanced two potentially conflicting public interests:

1. One interest is environmental and generally supports remedial actions that remove the maximum amount of contamination without respect to costs.
2. Another interest is economic and generally supports remedial actions that achieve regulatory requirements by consideration cost effectiveness and targeting remediation to mitigate impacts on local businesses.

The consideration of public concern scores for each alternative are presented in Table 10.2-1. The scores are based on the degree that an alternative may balance these potentially conflicting priorities. In contrast to the other DCA criteria, which tend to favor alternatives at one end of the range or the other, consideration of public concerns tends to score alternatives in the middle the highest because of these countervailing priorities. As a result, Alternative M5 was scored highest, while Alternatives M6 and M4 were each scored slightly lower. Alternative M7 would satisfy the public desire for complete removal, but high cost, economic impacts, and disruption to the community from construction would potentially also be a concern for the public. Alternative M2 may not meet the public's desire for removal but quantitatively achieves the project remedial goals. Therefore, Alternatives M7 and M2 both scored lowest.

Commentary on Consideration of Public Concerns Scoring

Anchor QEA ranks the alternatives in the same order as Ecology and does not have any substantive technical disagreements with Ecology's proposed scoring at this time, as shown in Table 7. However, without any specific public input to date, the scores are speculative and may not represent the actual public concern.

Table 7
Comparison of Ecology and Anchor QEA Benefit Scoring for Consideration of Public Concerns

Alternative	Ecology Score	Anchor QEA Score	Rationale (Agreement/Disagreement)
M7 – Full Removal (All SMAs)	3.0	3.0	Agreement, complete removal in all SMAs scores 3.0 based on high cost, economic impacts, and disruption to the community from construction (economic interest).
M6 – Removal Focus (All SMA-3)	8.0	8.0	Agreement, complete removal in SMA-3 scores 8.0, balances environmental and economic interests.
M5: Expanded Partial Removal (top 2 to 4 feet SMA-3 and a portion of SMA-2) and Engineered Cap; new alternative	9.0	9.0	Agreement, expanded removal in SMA-3 and partial removal in SMA-2 scores 9.0, provides the best balance of environmental and economic interests.
M4: Partial Removal (top 2 feet throughout SMA-3) and Engineered Cap	8.0	8.0	Agreement, partial removal scores 8.0, balances environmental and economic interests.
M3: Targeted Removal (2 feet South Shoreline SMA-3) and Engineered Cap On-Grade (remainder of SMA-3)	5.0	5.0	Agreement, targeted removal in the south shoreline of SMA-3 scores 5.0, partially balances environmental and economic interests.
M2: Engineered Cap On-Grade (All SMA-3)	3.0	3.0	Agreement, engineered cap on-grade in SMA-3 scores 3.0, may not meet the public’s desire for removal (environmental interests).
M1: Source Control and Natural Recovery	n/a	n/a	Agree – M1 does not meet Threshold Criteria

Summary of DCA Outcomes for Ecology and Anchor QEA Scoring Scenarios

The scoring differences between Anchor QEA and Ecology are relatively minor. There is agreement on how the alternatives should be ranked relative to each other for each of the evaluation criteria. However, the differences in scoring of alternatives that include engineered capping (specifically for protectiveness, permanence, long-term effectiveness, and implementability) have a substantive impact on the outcome of the DCA.

Based on the scores Ecology assigned for engineered capping on-grade, we interpret that Ecology does not consider engineered capping to be a viable technology. Anchor QEA believes engineered capping is protective, permanent, effective, and implementable based on the rationale presented in this memorandum. Using a qualitative approach, Anchor QEA agrees that alternatives focused on engineered capping on-grade should score slightly lower than alternatives focused on removal and removal/engineered capping; however, we do not believe the low scores used by Ecology are justified. Tables 8 and 9 present the DCA outcome for Ecology's evaluation and Anchor QEA's evaluation.

Table 8
Ecology DCA Outcome

Criterion	Weighting	M-1	M-2	M-3	M-4	M-5	M-6	M-7
Protectiveness	30%	n/a	4	6.5	7	9	9	10
Permanence	20%	n/a	3	6.5	8	9	9	9.75
Long-term effectiveness	20%	n/a	2	5	6	8	8	10
Short-term risk	10%	n/a	8	7	7	6	5	3
Implementability	10%	n/a	4	6	8	8	8	5.5
Public comments/concerns	10%	n/a	3	5	8	9	8	3
Composite Benefit Score			3.7	6.1	7.2	8.4	8.2	8.1

Table 9
Anchor QEA DCA Outcome

Criterion	Weighting	M-1	M-2	M-3	M-4	M-5	M-6	M-7
Protectiveness	30%	n/a	6	7.5	8	9	9	10
Permanence	20%	n/a	6	7	8	9	9	9.75
Long-term effectiveness	20%	n/a	4.0	5	6	7	8	10
Short-term risk	10%	n/a	8	7	7	6	5	3
Implementability	10%	n/a	6	6	8	8	8	5.5
Public comments/concerns	10%	n/a	3	5	8	9	8	3
Composite Benefit Score			5.5	6.5	7.5	8.2	8.2	8.1

September 27, 2020; SLR email to Ecology on Creosote/Fuel Oil Area Hotspot Footprint

From:	R. Scott Miller
Sent:	September 21, 2020 10:15 AM
To:	Alam, Mahbub (ECY)
Subject:	RE: hotspot footprint
Attachments:	9-1-2020 CREOSOTE FUEL OIL ALT 7.pdf; Discussion Figure from 06-07-2017-email with draft markings.pdf; 9-21-2020 CREOSOTE FUEL OIL ALT 7 - DRAFT FIGURE.pdf

Hello Mahbub,
I'll give you a call this afternoon. It appears we had a misalignment on the hotspot footprint for the Creosote/Fuel Oil Area, the sampling locations encompassed. Three draft, discussion level figures are attached.
Thank you,
Scott

SLR

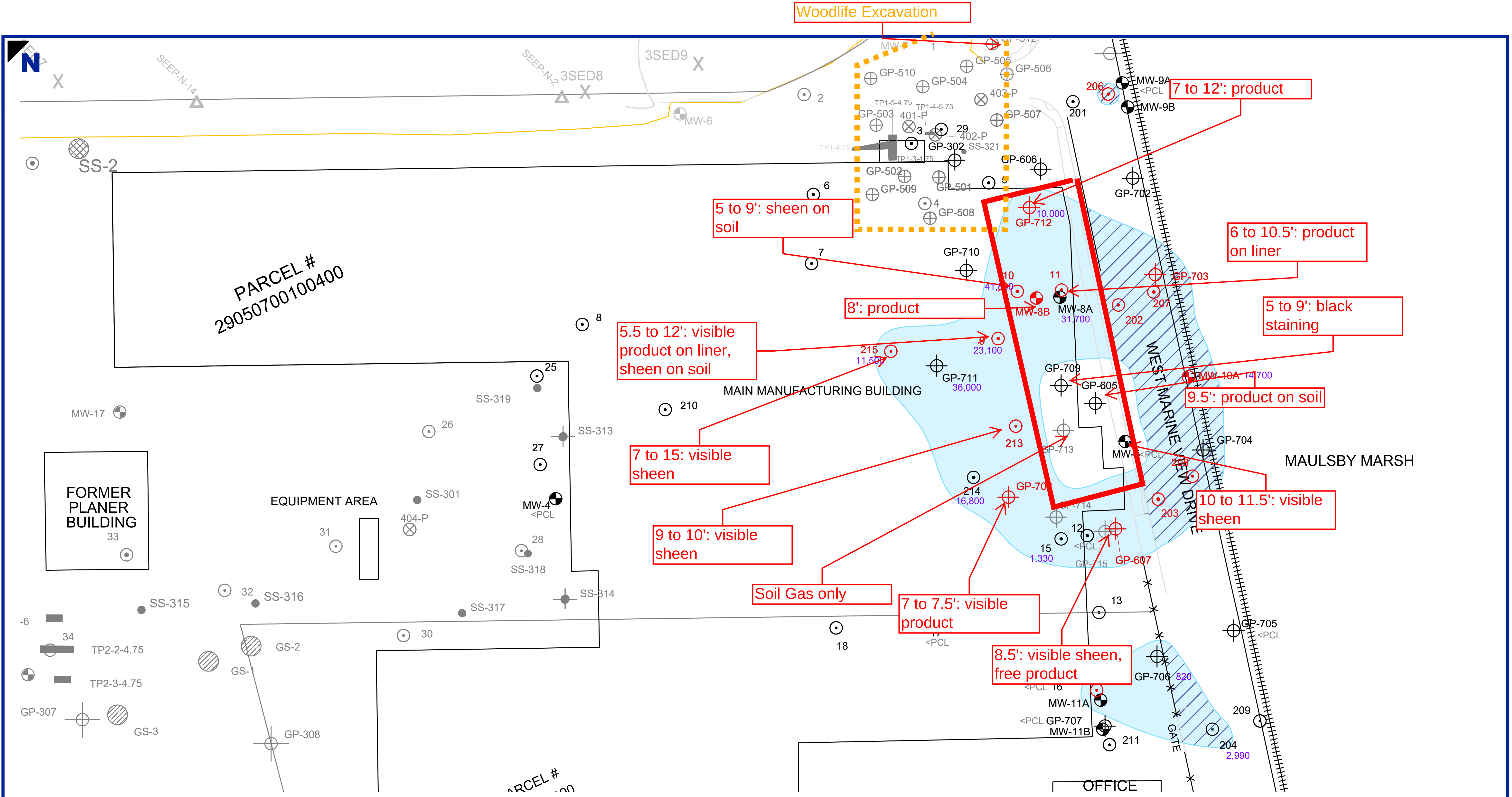
R. Scott Miller, P.E.
Managing Principal
D 503-905-3422
O 503-723-4423
C 503-572-1124
E smiller@slrconsulting.com

SLR International Corporation
1800 Blankenship Road, Suite 440, West Linn, OR 97068

From: Alam, Mahbub (ECY) <MALA461@ECY.WA.GOV>
Sent: September 17, 2020 11:00 AM
To: R. Scott Miller <smiller@slrconsulting.com>
Subject: hotspot footprint

Scott:
This is what Ecology proposed for hotspot removal in the meeting.
Let me know if you have any questions.
Thanks,

Mahbub Alam, PhD, PE
Environmental Engineer, Toxics Cleanup Program
Department of Ecology
PO Box 47600, Olympia, WA 98504-7600
(360) 407-6913; mala461@ecy.wa.gov



LEGEND

SOIL DATA

⌖ NO DATA FOR THIS DEPTH RANGE

⌖ NO PRODUCT/SHEEN VISIBLE ON BORING LOGS

⌖ PRODUCT/SHEEN VISIBLE ON BORING LOGS

▭ PROPOSED TREATMENT AREA

GROUNDWATER DATA

1,000 CONCENTRATION OF TPH (DIESEL RANGE; µg/L)

<PCL BELOW THE PRELIMINARY CLEANUP LEVEL (<500 µg/L)

PROPOSED TREATMENT AREA

▭ TOTAL AREA = 76,500 SQFT

▭ ON-SITE AREA = 50,200 SQFT

▨ OFF-SITE AREA = 26,300 SQFT

SLR

ANCHOR QEA

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 90 180 270'

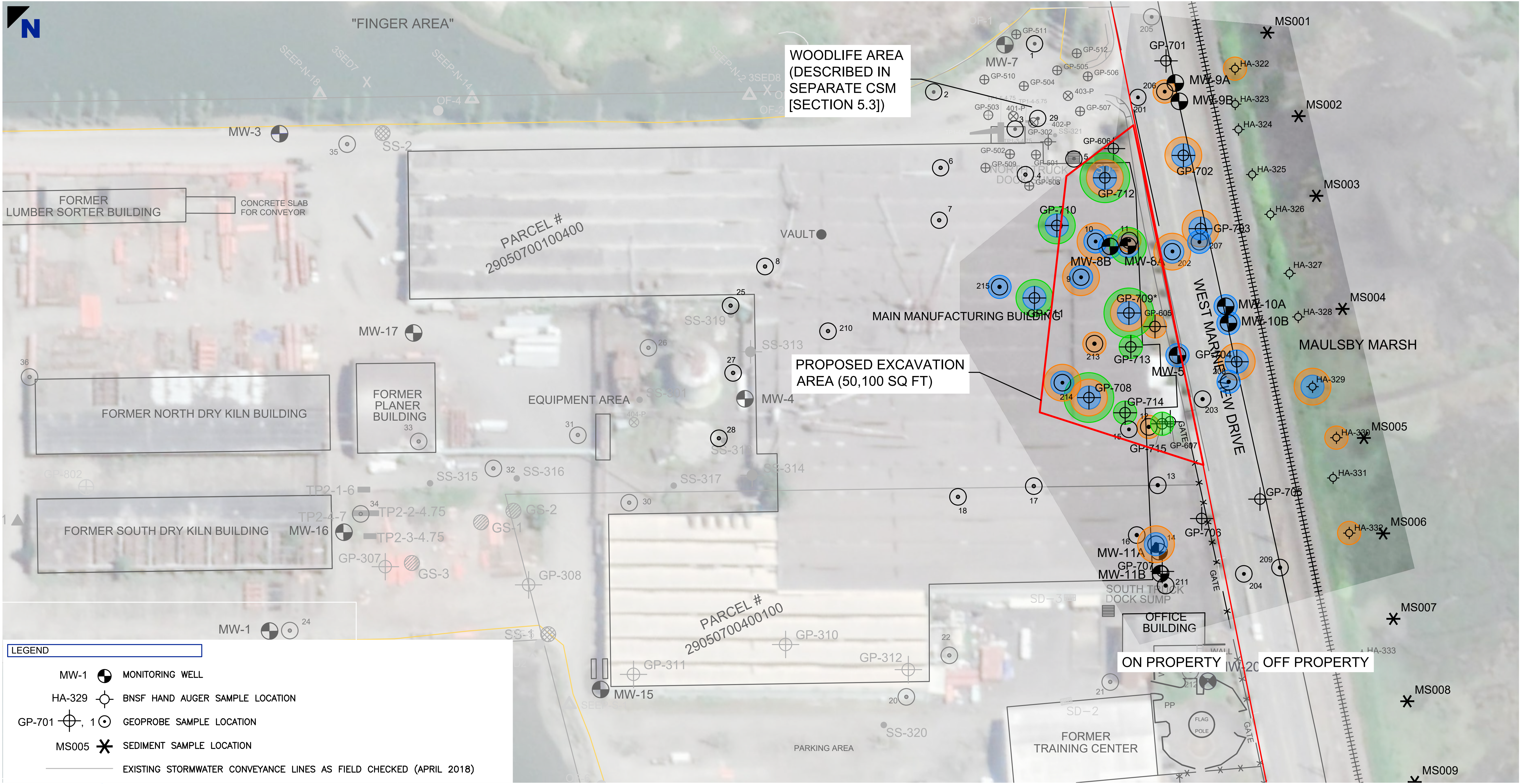
FORMER E.A. NORD
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
REMEDIAL INVESTIGATION FEASIBILITY STUDY

Drawing
IMPACTED AREA - 5 TO 10 FEET

Date	April 2020	Scale	AS SHOWN	Fig. No. TBD3
File Name	SW_NORD_VOLUMES_2	Project No.	108.00228.00061	

N:\Portland\Projects\JELD-WEN\JELD-WEN NORD DOOR\RI-FS Report\2020\Figures\CAD\FS\SW_NORD_VOLUMES_2.dwg



LEGEND

MW-1 ◐ MONITORING WELL

HA-329 ⌖ BNSF HAND AUGER SAMPLE LOCATION

GP-701 ⊕, 1 ⊙ GEOPROBE SAMPLE LOCATION

MS005 ✱ SEDIMENT SAMPLE LOCATION

— EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)

🔵 GROUNDWATER EXCEEDANCE OF NAPHTHALENE PCL (BASED ON VAPOR INTRUSION)

🟠 SOIL EXCEEDANCE OF cPAH PCL (BASED ON DIRECT CONTACT)

🟢 SOIL GAS EXCEEDANCE OF NAPHTHALENE PCL

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 115 230 345'

JELD-WEN/FORMER NORD DOOR FACILITY
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
2020 REVISED RI/FS REPORT

Drawing
CREOSOTE/FUEL OIL - ALTERNATIVE 7

Date	August 2020	Scale	AS SHOWN	Fig. No.
File Name	SW_NORD_NTL POLE_ALT 7	Project No.	108.00228.00061	8.4.1.1-f

SLR

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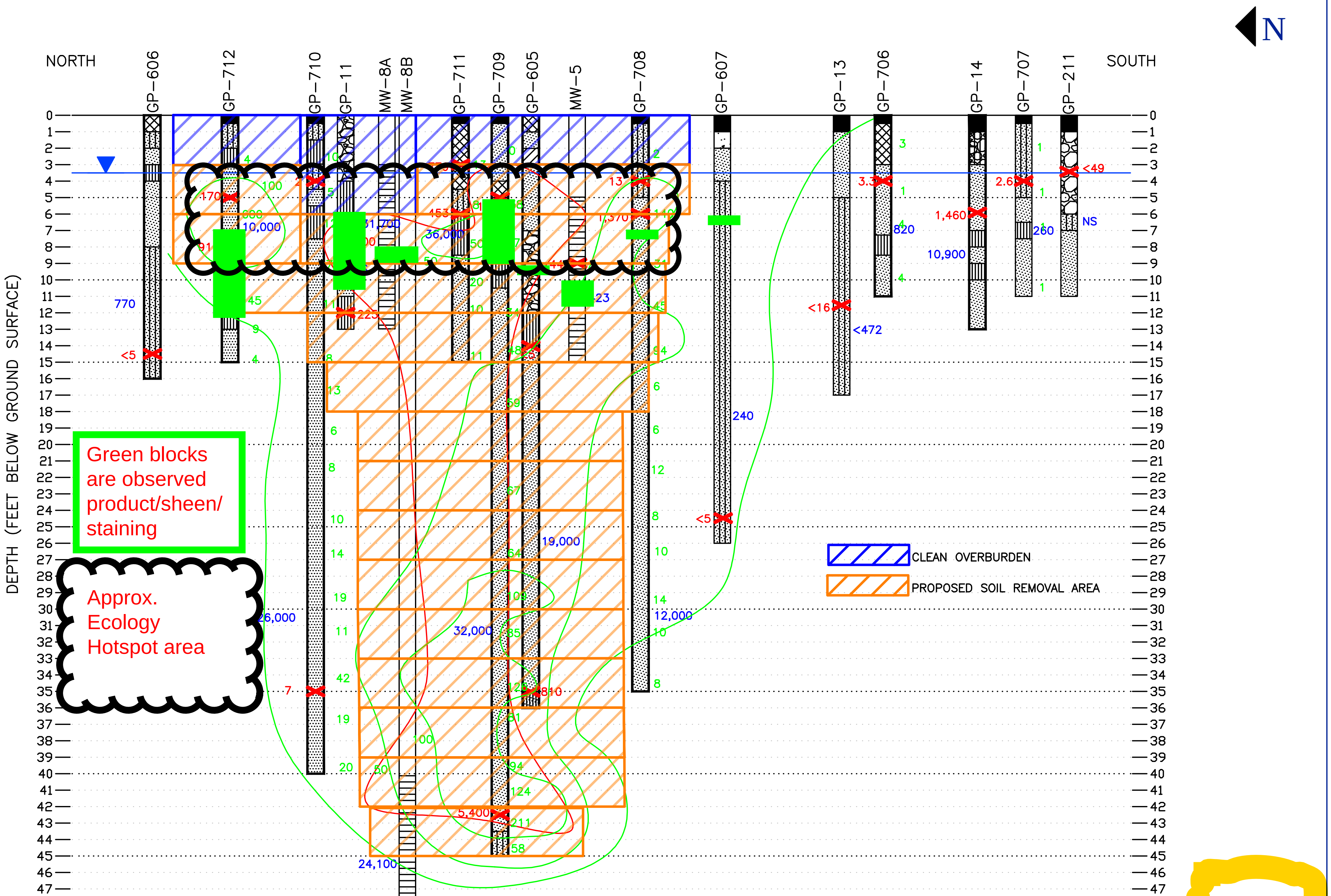
Last Saved: June 01, 2017 8:43:22 AM by ckramer Drawing path: N:\Portland\Projects\JELD-WEN\JELD-WEN NORD DOOR\2015 Assessment\FIGURES\X SECTION_090815.dwg



Interval (feet)	Area (SQFT)	Volume (CUFT)	Avg Conc (mg/kg)	Dirty Mass Removed (Vol*Avg Conc)	Clean Mass Removal Needed (Vol)	% Removed	Cum % Removed
0-3	34453	103359	0	0	0	0%	0%
3-6	34453	103359	2,500	258398438	103359	12%	12%
3-6	6699	20098	0	0	0	0%	0%
6-9	35889	107666	15,000	1614990234	20098	73%	85%
9-12	34453	103359	135	13953516	0	1%	85%
12-15	28711	86133	112	9646875	0	0%	86%
15-18	25002	75007	500	37503662	0	2%	88%
18-21	21055	63164	500	31582031	0	1%	89%
21-24	21055	63164	500	31582031	0	1%	90%
24-27	21055	63164	500	31582031	0	1%	92%
27-30	21055	63164	500	31582031	0	1%	93%
30-33	21055	63164	500	31582031	0	1%	95%
33-36	21055	63164	500	31582031	0	1%	96%
36-39	21055	63164	500	31582031	0	1%	98%
39-42	21055	63164	500	31582031	0	1%	99%
42-45	15791	47373	500	23686523	0	1%	100%

APPROXIMATE HORIZONTAL SCALE
0 75 150 225'

APPROXIMATE VERTICAL SCALE
0 7.5 15 22.5'

NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH-Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

▼		APPROXIMATE GROUNDWATER LEVEL
■	AS	ASPHALT
▨	CL	CLAY
☐		CONCRETE
▦	GM	GRAVEL WITH SILT
▦	GP	GRAVEL AND SAND
☐	PT	PEAT
▥	ML	SILT
▩	SM	SILTY SAND
▒	SP	SAND
☒		TOPSOIL
✕		SOIL SAMPLE LOCATION
200		SOIL ANALYTICAL RESULTS (TPH-Dx DIESEL RANGE IN MG/KG)
700		GROUNDWATER ANALYTICAL RESULTS (TPH-Dx DIESEL RANGE IN ug/L)
NS		NOT SAMPLED FOR SELECTED PARAMETER
25.2		PID READING IN PPM (700 SERIES GEOPROBE LOCATIONS ONLY)
—		PID CONTOURS IN PPM

FORMER E.A. NORD
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
--

Drawing
CROSS-SECTION FOR ONSITE SAMPLE LOCATIONS WITH TPH-DX ANALYTICAL RESULTS

Date June 1, 2017
Scale AS SHOWN
Fig. No.
File Name X SECTION_090815
Project No. 108.00228.00048

SLR

November 12, 2020; Ecology Response to September 3, 2020 Memo on Revised Marine Alternatives and Benefit Scoring Rationale

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 12, 2020

Bonnie J. Basden, C.E.C.M
Director Environmental Permitting
JELD-WEN, Inc.
3250 Lakeport Boulevard
Klamath Falls, OR 97601

Re: Response to JELD-WEN's September 3, 2020, Memorandum titled "JELD-WEN/Former Nord Door Facility RI/FS Revised Marine Alternatives and Benefit Scoring Rationale" regarding the following site:

- **Site Name:** JELD-WEN, Inc.
- **Site Address:** 300 W Marine View Drive, Everett, 98201-1030
- **Facility Site ID:** 2757
- **Cleanup Site ID:** 4402

Dear Bonnie Basden:

This letter is a response to JELD-WEN's September 3, 2020, memo regarding the Department of Ecology's (Ecology) comments and revisions to the April 2020, Draft Remedial Investigation/Feasibility Study (RI/FS) marine alternatives and benefits scoring rationale. JELD-WEN's memo documents changes to the range of alternatives that will be presented in the final RI/FS, as well as JELD-WEN's agreements and disagreements with Ecology's revised scoring and rationale. Ecology understands that JELD-WEN disagrees with some of the relative scores and rationale assigned to the alternatives in the following MTCA Disproportionate Cost Analysis categories: Permanence, Protectiveness, Long-Term Effectiveness, and Implementability (JELD-WEN agrees with the relative scores and rationale assigned to the alternatives in the "Short-Term Risk" and "Consideration of Public Concerns" categories.)

Ecology provided written comments on the April 2020, RI/FS on June 19, 2020, in a memo, a revised alternatives scoring spreadsheet, and comments within the document body. Ecology's position on the scoring and rationale remains unchanged. The rationale is further explained in this letter in response to the memorandum received in September. As communicated previously, Ecology expects its justification and scoring will be incorporated into the final RI/FS.

The requested changes should be provided to Ecology in redline form in a Word document for final review. In particular, Section 10.2.1 “Detailed Evaluation and Comparison of Marine Alternatives” should reflect Ecology’s scoring and rationale provided in June and in subsequent verbal and written communication.

Response to September 3, 2020, “Background” Section

Ecology noted that the “Background” section of the September 3, 2020, memo greatly abbreviated Ecology’s rationale for requesting revisions to the April 2020, Draft RI/FS. In comments Ecology provided to JELD-WEN on June 19, 2020, Ecology explained significant concerns with JELD-WEN’s quantitative scoring system for evaluating the benefits of each cleanup alternative. In particular, the proposed scoring approach minimized the benefits of remediation of the most highly contaminated marine areas. The scoring system decoupled cleanup actions in the different Sediment Management Areas (SMAs) rather than evaluating the combined effectiveness of remedial actions in SMA-1, SMA-2, and SMA-3 in meeting threshold requirements, and the six MTCA criterion (permanence, protectiveness, long-term effectiveness, management of short-term risk, technical and administrative implementability, and consideration of public concerns). Greater weight was assigned by JELD-WEN to the cleanup technologies used within SMA-1 compared to SMA-3 because the weighting system was based on area, and SMA-1 is more than twice the size of SMA-3. However, SMA-3 contains greater levels of cleanup level exceedances than SMA-1. The scoring approach essentially devalued hotspot removal and decoupled remedial activities in different SMAs. However, actions in each of the SMAs must to be evaluated together for this Site to determine compliance with cleanup standards and the degree to which other MTCA criteria are met. Ecology’s rationale for requesting the elimination of JELD-WEN’s proposed weighting system and quantitative evaluation is more fully described in the June 19, 2020, memo to JELD-WEN. Ecology rescored the alternatives without the area-weight factors and provided written justification for its scores within a revised alternatives analysis table (“Table 10.2-1_May_2020_EcyEdited”) and within the body of the June 19, 2020 memo.

Response to September 3, 2020, Memo “DCA Evaluation Criteria” Section
(Note: Alternatives Are Referenced Using the Revised Naming Scheme)

After Ecology provided comments on the April 2020, Draft RI/FS, Ecology and JELD-WEN subsequently agreed to remove three of the lower scoring alternatives (the April 2020, Draft RI/FS’s Alternatives M3, M4a and M4b) in order to present a more streamlined alternatives analysis to the public. The following alternatives will be presented in the final FS and are primarily different in their treatment of Sediment Management Area 3 (SMA-3):

- M-1: Source control and natural recovery (not scored)
- M-2: Engineered Cap On-Grade throughout SMA-3

- M-3: Targeted Removal and Engineered Cap (2 ft. depth) in SMA-3 southern shoreline and Engineered Cap On-Grade in SMA-3 inlet
- M-4: Partial Removal and Engineered Cap (2 ft. depth) throughout SMA-3
- M-5: Expanded Partial Removal (2 to 4 ft. depth SMA-3 southern shoreline and portion of SMA-2; 2 ft. depth in SMA-3 inlet) and Engineered Cap
- M-6: Removal Focus: Full removal throughout SMA-3
- M-7: Full Removal: Full removal in all SMAs

The technical disagreements presented in the September 3, 2020, memo are with the relative scoring of Alternatives M-2, M-3 and M-4 in the Protectiveness category; M-2 and M-3 in the Permanence category; M-2 in the Long-Term Effectiveness category; and M-2 in the Implementability category. In general, JELD-WEN thought these alternatives should have a smaller relative difference in score than Ecology assigned to them compared to more permanent remedies.

The greatest area of disagreement was with Ecology's assessment of the protectiveness, permanence, long-term effectiveness and implementability of Alternative M-2, which is different from all other alternatives in that is utilizes cap-on-grade throughout SMA-3 and incorporates no removal of contaminated media.

As an example, in the permanence category, JELD-WEN wrote, "Capping has been demonstrated to be effective on sediment cleanup projects in Puget Sound and throughout the United States. The technology has been approved by the US EPA and is designed using rigorous engineering methods. The significant reduction in score between M-3 [score of 6.5] and M-2 [score of 3.0] is not justified and implies inherent flaws in engineered capping that are not borne out in experience or in guidance documents including SCUM."

Ecology's scores reflect its site-specific evaluation of the performance, overall benefits, overall impacts, and risks associated with each of the alternatives compared to most permanent remedy (M-7). The Sediment Management Areas encompass intertidal estuarine habitat that abuts an upland property built from fill material into the Snohomish River estuary. SMA-3 inlet is part of an area designated as an "Aquatic Conservancy Area" by the City of Everett and SMA-3 southern side/knoll consists of an expansive tidal mudflat along a shoreline that receives heavy wave action, apparent from significant undermining of the bank in recent years. All SMAs are within Tribal Usual and Accustomed Hunting and Fishing Grounds. Remedial actions at the site are vulnerable to climate change impacts such as sea level rise, increased river flooding and increased frequency of severe storms.

Based on the climate change assessment in Appendix C of the RI/FS, sea level is expected to rise between 0.5 – 2.0 feet by mid-century (depending on emissions projection scenario used) and current 100-year storms are expected to occur more frequently, becoming a 25-year storm. Ecology incorporated these site-specific characteristics and risks in its relative scoring.

To explain further, Alternatives M3 through M7 incorporate partial or full removal and the majority of the dredged/excavated sediment is anticipated to be disposed of at an upland disposal facility. Full or partial removal paired with engineered cap at-grade scored significantly higher than engineered cap on-grade within SMA 3 for the protectiveness, permanence, long-term effectiveness, and implementability categories for the following reasons:

- SMA 3 contains the highest contaminant concentrations.
- SMA 3 (southern shoreline, in particular) contains contamination that is relatively shallow (0-4 feet below the surface) and where removal could occur while the tide is out, posing a lower risk of recontamination. Excavated areas could be capped before being exposed to the incoming tide, reducing the potential release of dredge residuals.
- For alternatives that include sediment removal, disposal is anticipated to occur at an off-site Subtitle D landfill (FS sections 8.5.6 through 8.5.9 and FS cost estimate table). The Sediment Management Standards (173-204-570(4)) provide a guide for assessing the long-term effectiveness and permanence of sediment cleanup remedial actions. Removal and disposal of contaminated media in an upland engineered facility is generally assigned more permanence and long-term effectiveness than a containment remedy due to the low likelihood of subsequent releases or exposure to the contaminants.
- The banks of the southern shoreline of the property have been heavily eroded by wave action, particularly during winter storms, indicating that an engineered cap built above grade along the shoreline will be subject to strong erosive forces that will become more severe over time due to climate change. 100-year storm events are anticipated to occur more frequently, becoming a 25-year storm. Extreme precipitation events are anticipated to occur more frequently, with more frequent erosion likely in vulnerable areas. Full or partial removal and capping at-grade provide greater resilience to climate change risks than engineered cap on-grade alternatives.
- The contaminants of concern are persistent and bioaccumulative necessitating indefinite performance of an engineered cap. Removal actions and capping at-grade rather than on-grade are expected to significantly reduce long-term maintenance and monitoring efforts and costs.
- Full or partial removal and capping at-grade allows restoration of the existing habitat. If a cap on-grade alternative is selected the habitat in SMA-3 would be altered due to changes in elevation and grain size. The southern shoreline, and possibly the inlet, would need to be hard armored to protect against wind and waves. Hard-armored shorelines are associated with negative changes in species assemblages and interference with natural sediment processes.

Ecology’s scoring reflects a site-specific comparison of cleanup technologies at achieving each of the seven MTCA criteria. Ecology acknowledges that engineered capping has been effectively used at other sites in the Puget Sound and elsewhere in the U.S. Ecology scored alternatives that include both removal and engineered capping relatively high compared to the full removal alternative. Ecology agrees that M-2 meets the threshold requirements. However, we have significant concerns with the performance of a cap on-grade remedy compared to a partial or full removal action in SMA-3 *at this site and along the southern shoreline in particular.*

Alternatives that incorporate cap on-grade also change the existing habitat by raising the elevation of intertidal areas, altering substrate, and necessitating the creation of a hard armor shoreline in some areas. For the reasons outlined here and in previous comments, Ecology scored M-2 and M-3 significantly lower in some categories compared to other alternatives.

Ecology understands that JELD-WEN has a different professional opinion about the scores assigned in some categories. We respectfully disagree with the scoring presented and request that Ecology’s scores and rationale be used in the Final FS.

Ecology expects that JELD-WEN will revise the scoring and discussion text per Ecology rationale/narrative and provide a complete alternatives analysis with alternative M5 as the recommended alternative for the FS (Ch. 10 & 11).

For upland Cleanup Areas, Ecology is waiting to see a revised alternatives analysis (complete DCA with cost analysis) that incorporates Ecology alternative 7 (hotspot soil removal, ISB, MNA) as the recommended alternative for cleanup.

Should JELD-WEN have additional questions regarding Ecology’s position/input on the DCA narrative as it revises the RI/FS, please contact me at 360 407 6913 or by email at mahbub.alam@ecy.wa.gov.

Sincerely,

Mahbub Alam

Mahbub Alam, PhD, PE
Environmental Engineer
Toxics Cleanup Program

cc: Jason Cornetta, Anchor QEA LLC
John LaPlante, PE, QEA LLC
R. Scott Miller, PE, SLR
Nathan Soccorsy, Anchor QEA LLC
Peter Adolphson, Ecology
Susannah Edwards, Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

January 11, 2021

Bonnie J. Basden, C.E.C.M
Director Environmental Permitting
JELD-WEN, Inc.
3250 Lakeport Boulevard
Klamath Falls, OR 97601

Re: Decision Regarding Request for Dispute Resolution, Agreed Order No. DE 5095

- **Site Name: JELD-WEN, Inc.**
- **Facility Site ID: 2757**
- **Cleanup Site ID: 4402**

Dear Bonnie J. Basden:

This letter responds to JELD-WEN's letter dated December 18, 2020, requesting dispute resolution at the JELD-WEN, Inc. (JELD-WEN) Site. Even though JELD-WEN's request for dispute resolution was untimely (Agreed Order No. DE 5095, section VIII.J.1.a, page 17), the Department of Ecology (Ecology) project coordinator conferred with the JELD-WEN project coordinator in an effort to resolve the matters in order to move forward with the cleanup. On December 29, 2020, the Ecology project coordinator had a phone conversation with the JELD-WEN project coordinator regarding the disputes. Ecology and the JELD-WEN project team had a thorough discussion on the disputed items on January 5, 2021. At JELD-WEN's request, the Ecology project coordinator is providing the following decisions regarding the disputes.

The overall intent of the Model Toxics Control Act (MTCA) is to "use permanent solutions to the maximum extent practicable" (WAC 173-340-360(2)(b)) and select clean up actions using a disproportionate cost analysis (WAC 173-340-360(3)(e)) which favors more permanent, more protective, and more effective cleanups within a reasonable restoration time frame, in order to protect human health and environment. Project costs are only relevant when two or more alternatives provide equal benefit.

Objection 1: JELD-WEN objects to Ecology's cost estimate for Alternative 7.

Ecology's Decision: Ecology agrees that revised costs for building demolition, excavation shoring, soil disposal rates, and the support/relocation of utilities in the excavation area can be included in the disproportionate cost analysis (DCA), but costs for repair of the building should not be included in the DCA because this cost is not directly related to perform remedial action. JELD-WEN may include this cost, which may be incurred to meet requirements outside of MTCA DCA consideration, in the RI/FS document as additional information.

Ecology's Rationale for the Decision: Ecology developed costs for Alternative 7 from the Alternative 4 provided by JELD-WEN in the April 30, 2020 RI/FS submittal. At that time, costs for building demolition of buffer area and relocation/support of utilities were not included. Ecology agrees with JELD-WEN's shoring rationale cost. However, Ecology does not agree that building repair cost can be part of the DCA because this additional work is not for remedy implementation. MTCA defines remedial action as:

> Any action or expenditure consistent with the purposes of this chapter to identify, eliminate, or minimize any threat posed by hazardous substances to human health or the environment including any investigative and monitoring activities with respect to any release or threatened release of a hazardous substance and any health assessments or health effects studies conducted in order to determine the risk or potential risk to human health.

RCW 70A.305.020(33).

Per this definition, reconstruction/repair of a building does not identify, eliminate, or minimize any threat posed by hazardous substances. Ecology does not include redevelopment cost as part of DCA since site development does not contribute to remedial action. This is explicitly mentioned in Ecology's remedial action grant rule (Chapter 173-322A WAC) which designates site development cost as ineligible for remedial action grant. See 173-322A-320 (5)(b)(vii) ("(b) **Ineligible costs.** Ineligible costs for an oversight remedial action grant include, but are not limited to, the following: . . . (vii) Site development and mitigation costs not required as part of a remedial action;").

Ecology understands JELD-WEN's position that it does not currently own the property and may not directly benefit from the building repair/reconstruction. JELD-WEN may incur this cost due to other obligations but this cost cannot be included in the DCA. Another important point is that even though Ecology does not approve including the building repair cost into the DCA, hypothetically, if this cost were included in the DCA, the outcome will not change the selection of Alternative 7 as the preferred remedy. JELD-WEN's argument for selection of lower cost alternative per DCA is discussed below as part of objections 2, 3, and 4.

Objection 2: JELD-WEN objects to Ecology’s DCA Cost Benefit Analysis Chart.

Objection 3: JELD-WEN objects to Ecology’s Evaluation of Cleanup Action Alternatives (Section 10.1-1) and DCA Summary and Closing (Section 11.1.1).

Objection 4: JELD-WEN objects to Alternative M5 as the preferred alternative for the marine remedy.

Ecology summarized these three objections into one response since they relate to the same argument that JELD-WEN made concerning Ecology’s DCA and selection of preferred alternative.

Ecology’s Decision: Upland Alternative 7 is Ecology’s preferred remedy as it is permanent to the maximum extent practicable and is not disproportionately costly to the lower cost of Alternative 2. Marine Alternative M5 is preferred remedy as it is similarly permanent to the maximum extent practicable and is not disproportionately costly to Alternative M4.

Ecology’s Rationale for the Decision: In its December 18, 2020 dispute letter, JELD-WEN correctly referenced MTCA that “Where two or more alternatives are equal in benefits, the department shall select the less costly alternative . . .” WAC 173-340-360(3)(e)(C). The rule uses the language “**equal in benefits**.” Note that upland Alternative 2 and Alternative 7 do not have equal benefits. Similarly, marine Alternative M4 and Alternative M5 do not have equal benefits. Therefore, Ecology is not required to select the less costly alternative for the upland and marine cleanups. JELD-WEN’s argument for selection of lower cost alternative per the rule is, therefore, without merit.

In its December 18, 2020 letter, JELD-WEN also quoted the rule language that “Costs are disproportionate to benefits if the incremental costs of the alternative over that of a lower cost alternative exceed the incremental degree of benefits achieved by the alternative over that of the other lower cost alternative.” WAC 173-340-360(3)(e). Ecology does not agree with JELD-WEN’s narrow interpretation of the DCA process. The DCA is one component of the overall remedy selection process. Ecology followed the overall process for remedy selection as specified in the rule (WAC 173-340-360) and the following are the main points and step-by-step procedure for its selection of both upland and marine remedies.

1. Cleanups under MTCA require the selected cleanup to “Use permanent solutions to the maximum extent practicable (see subsection (3) of this section).” WAC 173-340-360(2)(b)(i).

2. Subsection (3) of WAC 173-340-360 provides a process on how to determine if a cleanup action uses permanent solutions to the maximum extent practicable. The general requirement in subsection (3) states, "When selecting a cleanup action, preference shall be given to permanent solutions to the maximum extent practicable." WAC 173-340-360(3)(b). That regulation later introduces disproportionate cost analysis (DCA) as a tool. WAC 173-340-360(3)(e). However, the use of DCA does not negate the requirement that permanent solutions must be used to the maximum extent practicable. Both Alternative 7 (upland) and Alternative M5 (marine) are more permanent.

3. In the DCA procedure, alternatives are ranked from most to least permanent as specified in the rule. "The alternatives evaluated in the feasibility study shall be ranked from most to least permanent". WAC 173-340-360(3)(e)(ii)(A). The alternative with greatest degree of permanence becomes "the baseline cleanup alternative against which cleanup alternatives are compared." WAC 173-340-360 (3)(e)(ii)(B). That subsection goes on to state that "If no permanent solution has been evaluated in the feasibility study, the cleanup action alternative evaluated in the feasibility study that provides the greatest degree of permanence shall be the baseline cleanup action alternative." WAC 173-340-360(3)(e)(ii)(B). Accordingly, Alternative 4 in the upland and Alternative M7 in the marine area are the baseline cleanup alternatives against which cleanup alternatives are considered. Ecology compared baseline cleanup alternative to the next most permanent alternative.

4. When comparing cleanup alternatives, Ecology can use a quantitative DCA test (WAC 173-340-360(3)(e)(ii)(C)). Ecology uses this as a guide to determine if the baseline alternative is disproportionately costly to the next permanent alternative. Sometimes this comparison may be qualitative based on best professional judgment. WAC 173-340-360(3)(e)(ii)(C).

5. Using the above procedure from WAC 173-340-360(3), Ecology determined that Alternative 7 is the most permanent cleanup to the maximum extent practicable when compared with baseline cleanup Alternative 4. If Alternative 7 is compared with the lowest cost Alternative 2, the incremental benefit outweighs the incremental cost. Even when hypothetically including the building repair cost in Alternative 7, the incremental cost increase is not significant enough to justify selection of Alternative 2. The benefits provided by Alternative 7 would still be proportionate and defensible compared to the increased costs. Alternative 7 provides greater degree of certainty and permanence associated with hotspot soil removal compared to biological treatment in Alternative 2, which suffers from a lesser degree of certainty, permanence, and effectiveness over long term. Alternative 7 results in quicker risk reduction due to mass removal of contaminants within a shorter time frame compared to

longer restoration timeframe necessary for biological treatment in Alternative 2. As such, Ecology prefers more permanent cleanup Alternative 7.

6. When comparing marine Alternative M4 and Alternative M5, Alternative M5 provides the greater overall benefit and is more permanent than Alternative M4. Alternative M5 includes more mass removal of hotspot areas. The additional removal provides greater protection from health impacts to humans and animals utilizing the tide flats, including future recreational and tribal subsistence shellfishers. Additional removal substantially decreases vulnerability of the remedy to climate change impacts, including more frequent severe storms expected over time. Ecology anticipates that contaminated sediment will be disposed of at an off-site Subtitle D landfill, as described in the Feasibility Study sections 8.5.6 through 8.5.9 and cost estimates. Due to the increased removal and disposal of the most highly contaminated marine sediments in an upland engineered facility, the likelihood of subsequent releases and exposure to contaminants is reduced compared to Alternative M4. The incremental decrease in cost between M4 and M5 is not significant enough to justify selection of Alternative M4. For these reasons, and reasons previously communicated to JELD-WEN, Ecology has determined that the incremental benefit of Alternative M5 is not disproportionate to the incremental cost. As such, Ecology prefers Alternative M5.

7. Other issues that played a role in Ecology's DCA comparison, using its best professional judgement, are:

    - Location of the site next to an environmentally sensitive area.
    - Impact of bigger and more frequent storms due to climate change impacts.
    - Earthquake vulnerability due to soil liquefaction.
    - Tribal subsistence fishery.

This letter provides Ecology project coordinator's decisions with respect to disputes raised by JELD-WEN per the Agreed Order No. DE 5095. The disputes were not raised in a timely manner as identified in the Agreed Order. In addition, using MTCA Selection of cleanup actions criteria, Ecology's selection of the preferred alternatives (Alternative 7 and Alternative M5) most clearly fit the remedial action that is most permanent, most protective, most effective, and remediates contamination with a short, practicable timeframe.

Ecology hopes these responses and additional rationale satisfy the issues raised in JELD-WEN's December 18, 2020 dispute letter. Ecology looks forward to working with JELD-WEN to finalize the RI/FS and to make progress towards the development Draft Cleanup Action Plan on this important cleanup to protect the human health and environment.

If you have any questions and concerns about this letter, you can call me at (360) 407-6913 or email me at mahbub.alam@ecy.wa.gov.

Sincerely,

Mahbub Alam

Mahbub Alam
Site Manager
Toxics Cleanup Program

cc: Connie Sue Martin, Schwabe Williamson & Wyatt

APPENDIX Q

SOURCE CONTROL EVALUATION SUMMARY REPORTS

Description: Contains copies of summary reports submitted to Ecology for Source Control Evaluation activities in 2017 and Data Gap Assessment activities in 2019. These investigations included groundwater seep sampling and groundwater transducer study. The associated laboratory reports are also included in this appendix.

Summary Report - 2019 Data Gap Assessment (SLR, 2019)

July 9, 2019

Mr. Mahbub Alam
Environmental Engineer, Toxics Cleanup Program
Department of Ecology
PO Box 47600
Olympia, WA 98504

Re: Summary Report - 2019 Data Gap Assessment
Former E.A. Nord Facility, Everett, Washington (FS ID 2757)

Dear Mahbub,

SLR International Corporation (SLR) has prepared the following summary report of field activities completed per the April 2019 Work Plan Addendum to the December 2017 Source Control Evaluation (SCE) Work Plan to Assess Data Gaps for completion of the Remedial Investigation (RI)/Feasibility Study (FS) for the Former E.A. Nord Door facility (i.e. JELD-WEN Cleanup Site; FS ID 2757). This summary report presents the selected investigation areas from the Work Plan, sampling activities, laboratory analytical results, and suggestions for additional sampling based on the findings.

1. DATA GAP ASSESSMENT ACTIVITIES AND FINDINGS

The scope of work completed for this data gap assessment was based on communications and discussions with Washington Department of Ecology (Ecology) following submittal of the January 2019 SCE Summary Report and upon Ecology's review of the October 2016 Final Draft RI/FS. In April 2019, SLR submitted, and Ecology approved, the Work Plan Addendum presenting the proposed sampling locations, sampling rationale, and proposed analytical suite for each sample location.

In general, proposed investigation areas were selected to assess potential data gaps from the seep sampling/initial SCE activities and historical upland assessments included as part of the RI. Field notes including soil boring logs and groundwater sampling forms are included in **Appendix A**.

Laboratory analytical results are summarized on **Table 1** and **Table 2**. Revised Preliminary Cleanup Levels (PCLs) were developed based on discussions with Ecology and to reflect changes to CLARC values for analytes measured above laboratory reporting limits during this assessment. A summary of the revised PCLs used for this assessment are shown on **Table 3** and **Table 4**. Copies of the laboratory analytical reports are included as **Appendix B** and laboratory data review documents are included in **Appendix C**.
The following section presents the work scope from the April 2019 Work Plan Addendum, the activities completed for this assessment, and a summary of findings for each investigation area.

Extent of Existing Groundwater Impacts and Deep Zone Assessment

Data Gap per Work Plan Addendum: Previously identified isolated area of soil and groundwater contamination (GP-14 and GP-707). Need to verify the presence and trend of contamination. Help define groundwater flow and gradient for deep zone.

Completed Data Gap Assessment: One soil boring was completed with a Geoprobe drilling rig (GP-MW-11) for collection of a depth composite soil sample from surface to 12' below ground surface (bgs). Soil sample GP-MW-11-SS was submitted for laboratory analysis of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyl (PCB) congeners, and dioxins/furans. The boring was extended to approximately 40' bgs to assess for potential deep zone impacts. Field observations and photoionization detector (PID) readings did not indicate soil impacts at this location. A shallow monitoring well (MW-11A) was installed with a hollow-stem auger drilling rig to a depth of 13' bgs with a 10' section of screen. An adjacent deep monitoring well (MW-11B) was installed to a depth of 41.5' bgs with a 10' section of screen and a 2' sump. Groundwater samples were collected and submitted for laboratory analysis of VOCs, SVOC, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), dioxin/furans (sample held pending soil results), and priority pollutant metals for MW-11A, and VOCs, SVOCs, cPAHs, and total petroleum hydrocarbons – diesel and oil range (TPH-Dx) for MW-11B, respectively.

Findings: Soil analytical results did not measure concentrations of contaminants of potential concern (COPCs) above PCLs (**Table 1**). Groundwater analytical results measured concentrations of arsenic at 5.95 micrograms per liter (µg/L), above the PCL of 5.0 µg/L (based on natural background), and copper at 6.34 µg/L, above the PCL of 2.4 µg/L. No evidence of dense non-aqueous phase liquids (DNAPL) was observed in the sump installed in deep monitoring well MW-11B.

Knoll Area

Data Gap from Work Plan Addendum: Previously identified isolated areas of groundwater impacts (GP-601 and GP-603). Need to assess groundwater impacts using a monitoring well, and define groundwater flow gradient and direction in the knoll area. Assess if PCB impacts observed at adjacent seep sample location S-16 are present in the knoll area.

Completed Data Gap Assessment: Three soil borings were completed with a Geoprobe drilling rig (GP-MW-12, GP-MW-13, and GP-MW-14) for collection of depth composite soil samples from surface to 12' bgs at each location.

Soil sample GP-MW-12-SS was submitted for laboratory analysis of VOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 25' bgs in the area of former boring GP-601 and test pit TP-16. Soil lithology consisted of sandy fill material (likely dredged due to presence of shell fragments) down to approximately 18' bgs, underlain by apparent native woody material. A thin layer of gray material that appeared to be pulverized rock was observed at approximately 18.5' bgs (sample collected for dioxin/furan analysis based on Ecology concerns it was buried ash material). Field observations and PID readings did not indicate soil impacts at this location. A monitoring well (MW-12A) was installed with a hollow-stem auger drilling rig to a depth of 25’ bgs with a 10’ section of screen. A groundwater sample (MW-12-GW) was collected and submitted for laboratory analysis of VOCs, cPAHs, PCB congeners, dioxin/furans (sample held pending soil results), and metals.

Soil sample GP-MW-13-SS was submitted for laboratory analysis of SVOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 25’ bgs in the area of former boring GP-603. Soil lithology consisted of sandy fill material (likely dredged due to presence of shell fragments) down to approximately 20’ bgs, underlain by apparent native woody material. Field observations and PID readings did not indicate soil impacts at this location. A monitoring well (MW-13A) was installed with a hollow-stem auger drilling rig to a depth of 25’ bgs with a 10’ section of screen. A groundwater sample (MW-13-GW) was collected and submitted for laboratory analysis of SVOCs, cPAHs, PCB congeners, dioxin/furans (sample held pending soil results), and metals.

Soil sample GP-MW-14-SS was submitted for laboratory analysis of SVOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 23’ bgs in the area of former boring GP-604 and upland of seep sample S-16. Soil lithology consisted of sandy fill material (likely dredged due to presence of observed shell fragments) down to approximately 17’ bgs, underlain by apparent native woody material. Field observations and PID readings did not indicate soil impacts at this location; however, a section of gravel fill material with a slag-like appearance was observed at 18.5’ bgs. A monitoring well (MW-14A) was installed with a hollow-stem auger drilling rig to a depth of 23’ bgs with a 10’ section of screen. A groundwater sample (MW-14-GW) was collected and submitted for laboratory analysis of SVOCs, cPAHs, PCB congeners, dioxin/furans (sample held pending soil results), and metals.

Findings: Soil analytical results did not measure concentrations of COPCs above PCLs at any of the three borings completed in the knoll area (**Table 1**). Concentrations of metals were measured above PCLs in groundwater at MW-12 (arsenic, copper, lead), MW-13 (copper and lead), and MW-14 (arsenic, copper)(**Table 2**). In addition, total PCB congeners were measured above the human-health based PCL of 7.0 picograms per liter (pg/L) at MW-12, MW-13, and MW-14 at 8,790 pg/L, 29,800 pg/L, and 16,100 pg/L, respectively (**Table 2**). The Toxic Equivalency Quotient (TEQ) value at each of these locations was calculated below the PCL for TEQ using ½ the detection limit for non-detect values.

Area 4 Locations

Data Gap from Work Plan Addendum: Previously identified isolated areas (identified as Area 4 in the RI/FS) of soil impacts at former borings GP-311 and GP-34. Assessment for the presence and trend of groundwater impacts. Further define groundwater flow gradient and direction and apparent mounding at existing monitoring well MW-1. Assess if PCB impacts observed at adjacent seep sample location S-1 are present.

Completed Data Gap Assessment: Two soil borings were completed with a Geoprobe drilling rig (GP-MW-15 and GP-MW-16) for collection of depth composite soil samples from surface to 12’ bgs at each location. Soil sample GP-MW-15-SS was submitted for laboratory analysis of VOCs and PCB congeners. The boring was extended to approximately 15’ bgs in the area of former boring GP-311 and near seep sample S-1. Soil lithology consisted of sandy fill material down to approximately 10.5’ bgs, underlain by an apparent native silt layer. Field observations and PID readings did not indicate soil impacts at this location. A monitoring well (MW-15A) was installed with a hollow-stem auger drilling rig to a depth of 13’ bgs with a 10’ section of screen. A groundwater sample (MW-15-GW) was collected and submitted for laboratory analysis of PCB congeners and metals.

Soil sample GP-MW-16-SS was submitted for laboratory analysis of TPH, SVOCs, cPAHs, PCB congeners, and dioxins/furans. The boring was extended to approximately 15’ bgs in the area of former boring GP-34 and test pit TP-2. Soil lithology consisted of sandy/gravelly fill material down to approximately 12’ bgs, underlain by an apparent native silt layer. Field observations and PID readings did not indicate soil impacts at this location. A monitoring well (MW-16A) was installed with a hollow-stem auger drilling rig to a depth of 13’ bgs with a 10’ section of screen. A groundwater sample (MW-16-GW) was collected and submitted for laboratory analysis of SVOCs, cPAHs, PCB congeners, dioxins/furans (held pending soil results), and metals.

Findings: Soil analytical results did not measure concentrations of COPCs above PCLs at MW-15 (**Table 1**). Concentrations of total PCB congeners and dioxin/furan TEQ were calculated above PCLs at MW-16. In groundwater, total PCB congeners were measured above the PCL of 7.0 pg/L at MW-15 and MW-16 at 125 pg/L and 286 pg/L, respectively. The TEQ value at each of these locations was calculated below the PCL for TEQ using ½ the detection limit for non-detect values.

Stormwater Conveyance System

Data Gap from Work Plan Addendum: Potential impacts from previously identified damaged or plugged facility-related stormwater lines. Assessment if leaks in the stormwater system have contributed to soil and groundwater impacts or show relationship to sediment sample results from outfall OF-8 and OF-9. Need to better define boundary of potential salt water intrusion inland as measured in groundwater.

Completed Data Gap Assessment: Three soil borings were completed with a Geoprobe drilling rig (GP-MW-17, GP-801, and GP-802) for collection of depth composite soil samples from surface to 12’ bgs at each location.

Soil sample GP-MW-17-SS was submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 15’ bgs in the area of previously identified damaged stormwater lines that discharge to the finger area via outfall OF-4 (**Figure 1**). Soil lithology consisted of sandy fill material. Field observations and PID readings did not indicate soil impacts at this location. A monitoring well (MW-17) was installed with a hollow-stem auger drilling rig to a depth of 13’ bgs with a 10’ section of screen. A groundwater sample (MW-17-GW) was collected and submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, dioxin/furans (sample held pending soil results), and metals.

Soil sample GP-801-SS was submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 15' bgs in the area of previously identified damaged stormwater lines that discharge to outfall OF-6. Soil lithology consisted of sandy fill material. Field observations and PID readings did not indicate soil impacts at this location. A temporary well was set and a groundwater sample (GP-801-GW) was collected and submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, and dioxin/furans (sample held pending soil results).

Soil sample GP-802-SS was submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, and dioxins and furans. The boring was extended to approximately 15' bgs in the area of previously identified damaged stormwater lines that discharge to outfalls OF-9 and OF-10. Soil lithology consisted of sandy fill material. Field observations and PID readings did not indicate soil impacts at this location. A temporary well was set and a groundwater sample (GP-802-GW) was collected and submitted for laboratory analysis of TPH, VOCs, SVOCs, cPAHs, PCB congeners, and dioxin/furans (sample held pending soil results).

Findings: Soil analytical results did not measure concentrations of COPCs above PCLs, with the exception of total PCBs at GP-802 that were measured at 4,250 pg/g, above the natural background concentrations of 3,500 pg/g (**Table 1**). In groundwater, total PCB congeners were measured above the PCL of 7.0 pg/L at MW-17, GP-801, and GP-802 at 164 pg/L, 17,600 pg/L, and 174 pg/L, respectively. The TEQ value at each of these locations was calculated below the PCL for TEQ using ½ the detection limit for non-detect values. In addition, arsenic in groundwater was measured at MW-17 at 43.9 µg/L, above the natural background concentration of 5.0 µg/L, and TEQ for cPAHs was calculated above the practical quantitation limit (PQL)-based PCL of 0.015 µg/L at GP-801 (**Table 2**).

Vertical and Horizontal Groundwater Flow and Gradient

Data Gap from Work Plan Addendum: Ecology has identified deep zone groundwater flow direction and gradient, potential vertical gradient, as well as a better understanding of site-wide groundwater gradient (including the knoll area) as data gaps. A transducer study was completed in 2007; however, fewer monitoring wells were present on-site at that time and no monitoring wells were completed as deep wells.

Completed Data Gap Assessment: A follow-up transducer study was performed by installing pressure transducers in select wells from May 6 to May 15. Pressure transducers were installed at all nested well locations (shallow and deep well), as well as several new and existing monitoring wells (**Figure 2**).

Findings: As seen in the 2007 transducer study, tidal influence on groundwater levels are limited to near shore locations including MW-3, MW-15, and MW-16. Minimal undulations associated with the tides were observed at other wells including the knoll area. Estimated tidal influence for a portion of the assessment is portrayed on **Figure 2** and in **Graph 1**. It should be noted that some small discrepancies shown in the wells across the road (MW-9A and MW-10A) may be caused by the adjacent railroad traffic. Estimated groundwater gradient and flow direction were consistent with observations from quarterly groundwater monitoring (see **Figure 3** for estimated gradient and flow for the deep zone wells).

2. FINDINGS FROM DATA GAP ASSESSMENT

Overall exceedances of PCLs from the data gap assessments are displayed on **Figure 1**.

General Soil Analytical Results

Exceedances of PCLs in soil during the data gap assessment were limited to total PCB congeners and dioxins/furans TEQ in soil sample GP-MW-16 and total PCB congeners in sample GP-802-SS. The TEQ value using ½ detection limit for non-detect values for dioxin-like PCB congeners was calculated below the PCL of 2.0 pg/g at each of these locations. Follow-up groundwater sampling at MW-16 and from GP-802 measured relatively low concentrations of total PCB congeners in groundwater and it does not appear that the elevated concentrations observed in the soil samples are readily mobilizing to groundwater at these locations.

Follow-up analysis for dioxins/furans in groundwater at MW-16 was received on June 18, 2019 and the Level IV quality assurance (QA) assessment is currently pending. Concentrations of dioxins/furans in groundwater at MW-16 measured 1.9 pg/L, which is below the PQL-based PCL of 63 pg/L.

General Groundwater Analytical Results

Exceedances of PCLs for metals in groundwater were limited to arsenic at MW-11A, MW-12, MW-14, and MW-16, copper at MW-11A, MW-12, MW-13, and MW-14, and lead at MW-12 and MW-13.

TPH-Dx, VOCs (including COPCs from RI/FS of benzene and naphthalene), and SVOCs were not measured above applicable PCLs in the groundwater samples.

TEQ values for cPAHs were calculated above the PCL from GP-801 and at MW-13. The PCL of 0.015 µg/L is based on the laboratory PQL provided by ARI laboratory using a low detection level method.

Concentrations of total PCB congeners were measured at each groundwater sample location. Relative elevated concentrations were limited to MW-12, MW-13, and MW-14 (knoll area locations) and GP-801. The concentration of total PCB congeners measured at MW-14 was 16,100 pg/L, compared to 16,200 pg/L measured at the adjacent Seep S-16 during the April 2018 seep sampling event; however, an analysis of total PCB congener groupings for the samples was not consistent between the two locations (further discussed below).

Total PCB Congener Assessment

Elevated concentrations of total PCB congeners in soil were observed in samples GP-MW-15-SS, GP-MW-16-SS, and GP-802-SS. Follow-up groundwater sampling at these locations measured relatively low concentrations of total PCB congeners and it does not appear that the elevated concentrations observed in the soil samples are readily mobilizing to groundwater at these locations. **Graph 2** presents the soil and groundwater analytical results for each location. Typically, PCBs are not considered mobile in groundwater however some of the highest groundwater concentrations (knoll area) did not correlate to soil concentrations at the same locations. This could be due to very low detection limits, colloidal interference (particularly at seep sample and temporary well GP-801), or the depth composite soil sampling method.

As one method to assess the potential relationship of the total PCB congener results across the Site, the contribution of each sub group of PCBs (i.e. mono-, Di-, Tri-, etc.) to the total PCB congener concentration was reviewed. As shown on **Graph 3**, some patterns were observed based on sample location; this includes similarities at MW-12 and MW-13 (knoll area), GP-801 and Seep S-16 (as opposed to assumed relationship of knoll area findings and adjacent Seep S-16), and upland locations MW-15, MW-16, MW-17, and GP-802. While the entire Site consists of fill material, filling activities have been completed at various times throughout the operational history of the Site and often from unknown sources of fill material.

Groundwater Gradient and Flow

As assessment of site-wide groundwater gradient and flow confirms the tidal influence of near-shore monitoring wells that was observed in the 2009 tidal assessment (**Figure 2**). In addition, vertical gradient from various groundwater assessments do not appear to be a significant factor in the site-wide hydrology, and minor observed differences between shallow and deep well water elevation measurements may be attributed to errors in measurement versus any vertical gradient.

3. ADDITIONAL ACTIONS TO BE CONSIDERED

With the recent expansion of the site monitoring well network, the scope and schedule for the next quarterly groundwater sampling event is being reviewed based on the recent analytical results and findings from this assessment, however, it is still expected to remain on the current quarterly schedule (July-Aug). Proposed revisions to the groundwater sampling plan will be provided to Ecology for review under separate cover.

JELD-WEN is reviewing available records regarding fill placement. It appears that the knoll area was initially filled in 1960’s. The sandy consistency of this material and observed shell fragments in the fill indicate that this material is primarily dredged material. The source of the fill material is unknown.

JELD-WEN is considering solid-phase micro-extraction (SPME) sampling in groundwater at MW-13 and MW-14 concurrently with SPME sampling of seep water from approximate seep locations S-3, S-16, and S-18 (pending observed seep flow at time of sampling event). SPME sampling is a sampling technique to assist with quantifying dissolved phase analytes with limited particle interference. The SPME samples will be submitted for PCB congeners. Actual SPME sampling locations will be discussed with Ecology and incorporated into a work plan addendum for Ecology's approval.

Sincerely,
SLR International Corporation

R. Scott Miller

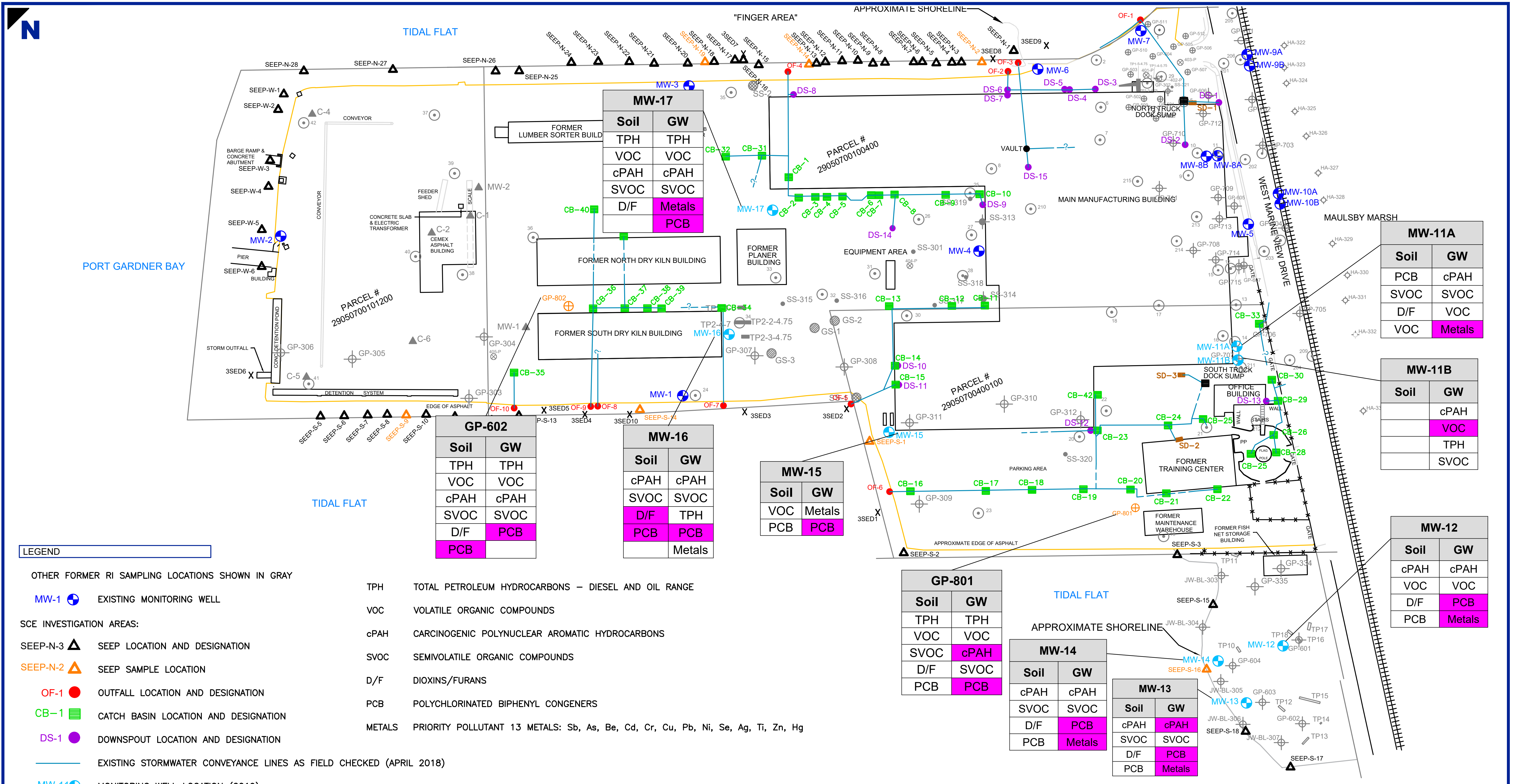
R. Scott Miller, P.E.
Managing Principal

Chris Kramer
Associate Scientist

cc Dwayne Arino, JELD-WEN Inc.

Enc. Figures
Tables
Graphs
Appendices

FIGURES



MW-17

Soil	GW
TPH	TPH
VOC	VOC
cPAH	cPAH
SVOC	SVOC
D/F	Metals
	PCB

GP-602

Soil	GW
TPH	TPH
VOC	VOC
cPAH	cPAH
SVOC	SVOC
D/F	PCB
PCB	

MW-16

Soil	GW
cPAH	cPAH
SVOC	SVOC
D/F	TPH
PCB	PCB
	Metals

MW-15

Soil	GW
VOC	Metals
PCB	PCB

GP-801

Soil	GW
TPH	TPH
VOC	VOC
SVOC	cPAH
D/F	SVOC
PCB	PCB

MW-14

Soil	GW
cPAH	cPAH
SVOC	SVOC
D/F	PCB
PCB	Metals

MW-13

Soil	GW
cPAH	cPAH
SVOC	SVOC
D/F	PCB
PCB	Metals

MW-11A

Soil	GW
PCB	cPAH
SVOC	SVOC
D/F	VOC
VOC	Metals

MW-11B

Soil	GW
	cPAH
	VOC
	TPH
	SVOC

MW-12

Soil	GW
cPAH	cPAH
VOC	VOC
D/F	PCB
PCB	Metals

LEGEND

OTHER FORMER RI SAMPLING LOCATIONS SHOWN IN GRAY

MW-1 ◐	EXISTING MONITORING WELL

SCE INVESTIGATION AREAS:

SEEP-N-3 △	SEEP LOCATION AND DESIGNATION
SEEP-N-2 △	SEEP SAMPLE LOCATION
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB-1 🟩	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
—	EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
MW-11 ◐	MONITORING WELL LOCATION (2019)
🟪	EXCEEDS PCL

TPH	TOTAL PETROLEUM HYDROCARBONS – DIESEL AND OIL RANGE
VOC	VOLATILE ORGANIC COMPOUNDS
cPAH	CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS
SVOC	SEMIVOLATILE ORGANIC COMPOUNDS
D/F	DIOXINS/FURANS
PCB	POLYCHLORINATED BIPHENYL CONGENERS
METALS	PRIORITY POLLUTANT 13 METALS: Sb, As, Be, Cd, Cr, Cu, Pb, Ni, Se, Ag, Ti, Zn, Hg

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 175 350 525'

SLR

FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
SUMMARY REPORT - 2019 DATA GAP ASSESSMENT

Drawing
SAMPLING LOCATIONS AND ANALYTICAL SUMMARY

Date	June 2019	Scale	AS SHOWN	Fig. No.
File Name	SW_SITE PLAN_NORD_2_05-23-19.	Project No.	108.00228.00059	1

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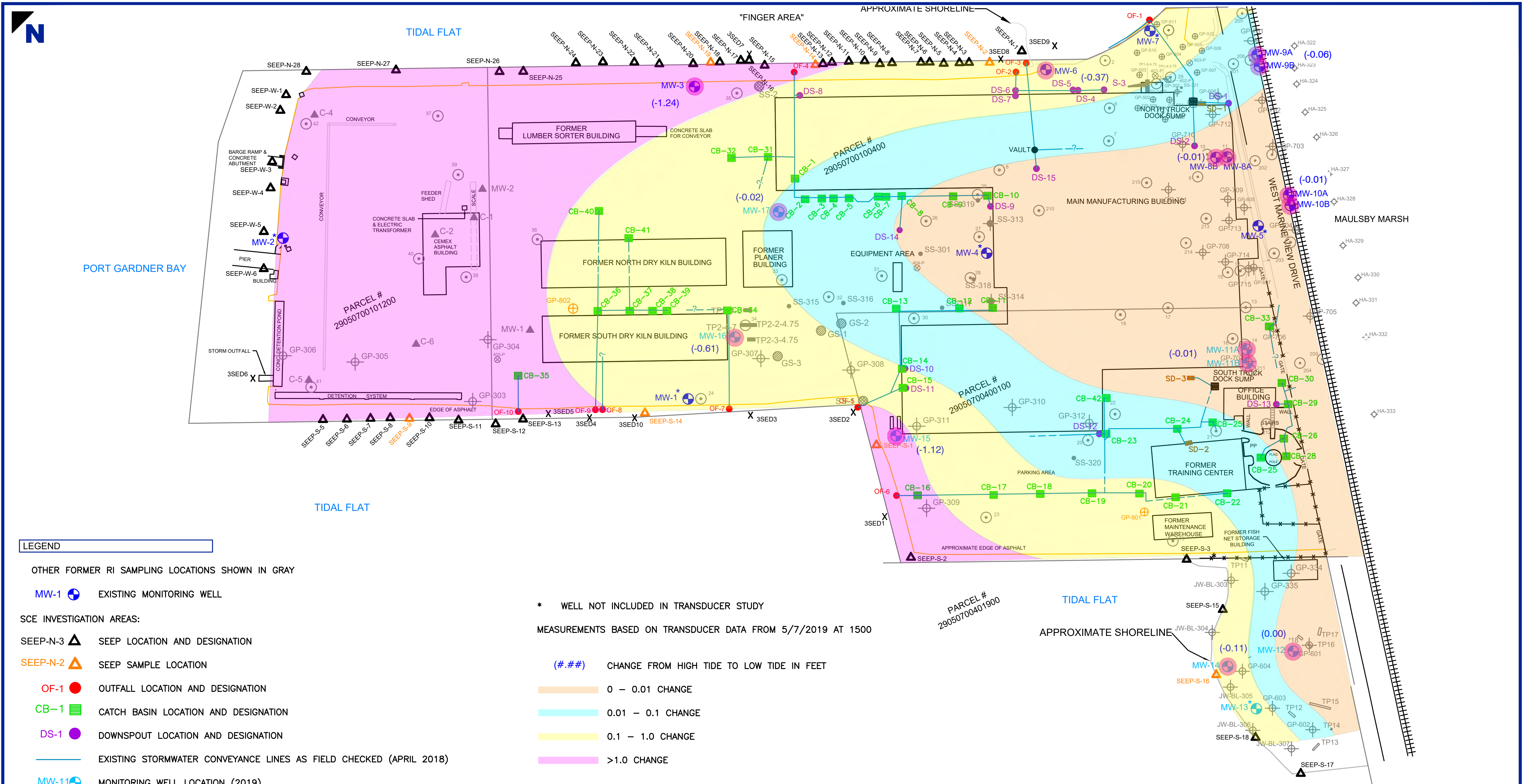

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LEGEND

OTHER FORMER RI SAMPLING LOCATIONS SHOWN IN GRAY

MW-1 ⊕	EXISTING MONITORING WELL

SCE INVESTIGATION AREAS:

SEEP-N-3 △	SEEP LOCATION AND DESIGNATION
SEEP-N-2 △	SEEP SAMPLE LOCATION
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB-1 🟩	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
—	EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
MW-11 ⊕	MONITORING WELL LOCATION (2019)
●	TRANSDUCER LOCATION

* WELL NOT INCLUDED IN TRANSDUCER STUDY

MEASUREMENTS BASED ON TRANSDUCER DATA FROM 5/7/2019 AT 1500

(#.##)	CHANGE FROM HIGH TIDE TO LOW TIDE IN FEET
🟧	0 – 0.01 CHANGE
🟦	0.01 – 0.1 CHANGE
🟨	0.1 – 1.0 CHANGE
🟪	>1.0 CHANGE

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 175 350 525'

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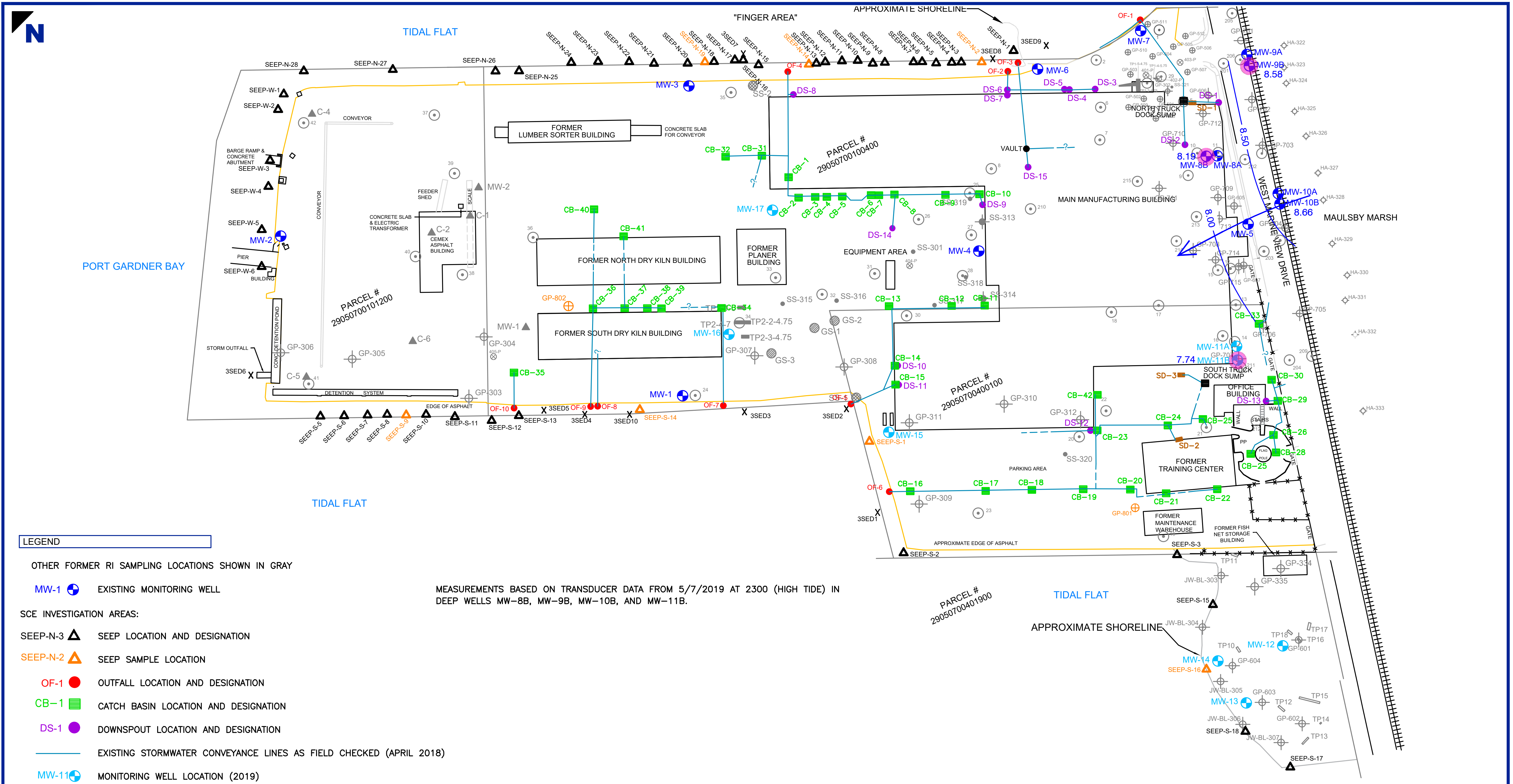
FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
SUMMARY REPORT - 2019 DATA GAP ASSESSMENT

Drawing
ESTIMATED TIDAL INFLUENCE

Date	June 2019	Scale	AS SHOWN	Fig. No. 2
File Name	SW_SITE PLAN_NORD_2_05-23-19.	Project No.	108.00228.00059	



MEASUREMENTS BASED ON TRANSDUCER DATA FROM 5/7/2019 AT 2300 (HIGH TIDE) IN DEEP WELLS MW–8B, MW–9B, MW–10B, AND MW–11B.

LEGEND

OTHER FORMER RI SAMPLING LOCATIONS SHOWN IN GRAY

MW-1 ⊕	EXISTING MONITORING WELL

SCE INVESTIGATION AREAS:

SEEP-N-3 △	SEEP LOCATION AND DESIGNATION
SEEP-N-2 △	SEEP SAMPLE LOCATION
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB-1 🟩	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
―	EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
MW-11 ⊕	MONITORING WELL LOCATION (2019)
●	TRANSDUCER LOCATION
#.#	ESTIMATED GROUNDWATER CONTOUR
―	GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
→	ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 175 350 525'

SLR

FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
SUMMARY REPORT - 2019 DATA GAP ASSESSMENT

Drawing
ESTIMATED GROUNDWATER GRADIENT - DEEP WELLS

Date June 2019	Scale AS SHOWN	Fig. No. 3	
File Name SW_SITE PLAN_NORD_2_05-23-19	Project No. 108.00228.00059		

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TABLES

Table 1
Soil Analytical Summary Table
2019 Data Gap Assessment
Former E.A. Nord
Everett, WA

Lab Sample ID			Preliminary Cleanup Levels (PCLs) [a]	L1093844-01		L1093844-02		-		L1093844-04		L1093844-05		L1093844-06		L1093844-07		L1093844-08		L1093844-09		L1093844-10	
Client Sample ID				GP-MW-11-SS		GP-MW-12-SS		GP-MW-12-SS-18-19		GP-MW-13-SS		GP-MW-14-SS		GP-MW-15-SS		GP-MW-16-SS		GP-MW-17-SS		GP-801-SS		GP-802-SS	
Date Collected				04/25/2019		04/25/2019		04/25/2019		04/25/2019		04/25/2019		04/26/2019		04/26/2019		04/26/2019		04/26/2019		04/26/2019	
Method	Analyte	Units		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
2540 G-2011	TOTAL SOLIDS	%		**82.5**		**87.3**		**-**		**88**		**86.5**		**61.3**		**85**		**80.5**		85		89.3	
Total Petroleum Hydrocarbons - Diesel and Oil Range (TPH-Dx)																							
NWTPHDX-NO SGT	DIESEL RANGE ORGANICS	mg/kg	200	-		-		-		-		-		-		**62.7**		**3.81**	J	<47.1		**2.4**	J
NWTPHDX-NO SGT	RESIDUAL RANGE ORGANICS	mg/kg	2,000	-		-		-		-		-		-		**604**		**11.1**	J	**75**	J	**13.1**	
Volatile Organic Compounds (VOCs)																							
8260C	BENZENE	mg/kg	0.002	**0.000853**	J	<0.00115		-		-		-		<0.00163		-		<0.00124		**0.000507**	J	<0.00112	
8260C	ETHYLBENZENE	mg/kg	0.34	**0.00112**	J	<0.00286		-		-		-		<0.00408		-		<0.00311		<0.00294		<0.00280	
8260C	NAPHTHALENE	mg/kg	0.24	**0.00812**	J	<0.0143		-		-		-		**0.00883**	J	-		<0.0155		<0.0147		<0.0140	
8260C	TETRACHLOROETHENE	mg/kg	476	**0.00242**	J	<0.00286		-		-		-		**0.00162**	J	-		**0.000919**	J	<0.00294		<0.00280	
8260C	TOLUENE	mg/kg	0.22	**0.0043**	J	<0.00573		-		-		-		**0.00268**	J	-		<0.00621		<0.00589		<0.00560	
8260C	1,2,4-TRIMETHYLBENZENE	mg/kg	0.03	**0.00405**	J	<0.00573		-		-		-		<0.00815		-		<0.00621		**0.00167**	J	<0.00560	
8260C	1,2,3-TRIMETHYLBENZENE	mg/kg	0.03	**0.00299**	J	<0.00573		-		-		-		<0.00815		-		<0.00621		<0.00589		<0.00560	
Semivolatile Organic Compounds (SVOCs)																							
8270D	ACENAPHTHENE	mg/kg	5.0	**0.118**	J	-		-		<0.190		<0.193		-		<0.392		<0.207		<0.392		<0.373	
8270D	ANTHRACENE	mg/kg	114	<0.202		-		-		<0.190		**0.0479**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	BENZO(A)ANTHRACENE	mg/kg	TEQ	<0.202		-		-		<0.190		**0.0992**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	BENZO(B)FLUORANTHENE	mg/kg	TEQ	<0.202		-		-		<0.190		**0.0813**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	BENZO(G,H,I)PERYLENE	mg/kg	2,400	<0.202		-		-		<0.190		**0.0458**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	BENZO(A)PYRENE	mg/kg	TEQ	<0.202		-		-		<0.190		**0.081**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	CHRYSENE	mg/kg	TEQ	<0.202		-		-		<0.190		**0.0891**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	FLUORANTHENE	mg/kg	32	<0.202		-		-		<0.190		**0.19**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	FLUORENE	mg/kg	5.1	**0.058**	J	-		-		<0.190		<0.193		-		<0.392		<0.207		<0.392		<0.373	
8270D	INDENO(1,2,3-CD)PYRENE	mg/kg	TEQ	<0.202		-		-		<0.190		**0.0495**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	NAPHTHALENE	mg/kg	0.24	<0.202	J3	-		-		<0.190	J3	<0.193	J3	-		<0.392	J3	<0.0414	J3	<0.392	J3	<0.373	J3
8270D	PHENANTHRENE	mg/kg	24,000	**0.0532**	J	-		-		<0.190		**0.116**	J	-		<0.392		<0.207		<0.392		<0.373	
8270D	PYRENE	mg/kg	33	<0.202		-		-		<0.190		**0.187**	J	-		<0.392		<0.207		<0.392		<0.373	
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)																							
8270SIM	TEQ: ND=1/2DL	mg/kg	0.37	-		**0.004**		**-**		**0.003**		**0.006**		-		**0.009**		**0.009**		**0.024**		**0.004**	
Polychlorinated Biphenyls (PCBs)																							
1668A	Total PCBs	pg/g	3,500	**178**		**321**		-		**546**		**768**		**3,240**		**7,070**		**365**		**1,840**		**4,250**	
1668A	TEQ: ND=1/2DL	pg/g	2.0	**0.017**		**0.030**		-		**0.023**		**0.021**		**0.057**		**0.89**		**0.057**		**0.025**		**0.031**	
Dioxins and Furans																							
8290A	TEQ: ND=1/2DL	pg/g	5.2	**4.4**		**0.38**		**4.1**		**0.38**		**0.30**		-		**8.3**		**0.74**		**2.0**		**4.5**	

Notes:

Bold indicates measured above the laboratory reporting limit

Gray shading indicates measured above Preliminary Cleanup Level (PCL)

<0.00115 indicates measured less than laboratory reporting limit of 0.00115

a - PCL selection process and sources identifed in Table 3

Laboratory qualifiers are defined in laboratory reports (Appendix B) and analyzed in laboratory data review documents (Appendix C).

Table 2
Groundwater Analytical Summary Table
2019 Data Gap Assessment
Former E.A. Nord
Everett, WA

Lab Sample ID			Preliminary Cleanup Levels (PCLs)	L1093831-01		L1093831-03		L1096002-01		L1096002-02		L1096002-03		L1096002-04		L1096002-05		L1096002-08		L1096002-06		L1096002-07	
Field Sample ID				GP-801-GW		GP-802-GW		MW-11A-0519		MW-11B-0519		MW-12-0519		MW-13-0519		MW-14-0519		MW-15-0519		MW-16-0519		MW-17-0519	
Date Collected				04/26/2019		04/26/2019		05/03/2019		05/03/2019		05/03/2019		05/03/2019		05/03/2019		05/03/2019		05/03/2019		05/03/2019	
Method	Analyte	Units		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Metals																							
6020B	ANTIMONY	µg/L	90	-		-		<2.00		-		**6.55**		**2.05**		<2.00		<2.00		<2.00		<2.00	
6020B	ARSENIC	µg/L	5.0	-		-		**5.95**	J6	-		**18.7**		**4.38**		**16.6**		**0.587**	J	**3.03**		**43.9**	
6020B	CHROMIUM	µg/L	243,060	-		-		**20.5**	J6 O1	-		**4.82**		**2.45**		**3.55**		**1.29**	J	**1.24**	J	**6.43**	
6020B	COPPER	µg/L	5.0	-		-		**6.34**	B O1	-		**7.26**	B	**45.9**		**7.35**	B	**1.24**	J B	**3.49**	J B	**2.27**	J B
6020B	LEAD	µg/L	8.1	-		-		**1.01**	J	-		**11.2**		**23.6**		**2.10**		<2.00		**1.79**	J	**0.911**	J
6020B	NICKEL	µg/L	8.2	-		-		**4.17**		-		**7.67**		**2.96**		**2.85**		<2.00		**1.34**	J	**2.10**	
6020B	SELENIUM	µg/L	71	-		-		**0.49**	J B	-		<2.00		**0.683**	J B	**0.413**	J B	<2.00		<2.00		**0.391**	J B
6020B	ZINC	µg/L	81	-		-		**6.85**	J B O1	-		**27.7**	B	**20.0**	J B	**9.27**	J B	<25.0		**3.95**	J B	**3.76**	J B
7470A	MERCURY	µg/L	0.2	-		-		<0.200		-		<0.200		**0.0664**	J	<0.200		<0.200		<0.200		<0.200	
Total Petroleum Hydrocarbons - Diesel and Oil Range (TPH-Dx)																							
NWTPHDX-NO SGT	DIESEL RANGE ORGANICS	µg/L	500	**324**		<200		-		<200		-		-		-		-		-		**130**	J
NWTPHDX-NO SGT	RESIDUAL RANGE ORGANICS	µg/L	500	**396**		<250		-		<250		-		-		-		-		-		<250	
Volatile Organic Compounds (VOCs)																							
8260C	ACETONE	µg/L	7,200	**4.68**	J	**5.37**	J	**1.97**	J	**4.2**	J	**46.1**		-		-		-		-		**3.22**	J
8260C	BENZENE	µg/L	1.6	<0.500		<0.500		<0.500		<0.500		**0.207**	J	-		-		-		-		<0.500	
8260C	CARBON DISULFIDE	µg/L	400	<0.500		<0.500		<0.500		<0.500		**2.87**		-		-		-		-		<0.500	
8260C	CHLOROFORM	µg/L	1.2	<0.500		<0.500		<0.500		**1.32**		<0.500		-		-		-		-		<0.500	
8260C	N-HEXANE	µg/L	7.8	<5.00		<5.00		<5.00		<5.00		**4.74**	J	-		-		-		-		<5.00	
8260C	P-ISOPROPYLTOLUENE	µg/L	-	<0.500		<0.500		<0.500		<0.500		**3.81**		-		-		-		-		<0.500	
8260C	2-BUTANONE (MEK)	µg/L	1,740,000	<5.00		<5.00		<5.00		<5.00		**4.21**	J	-		-		-		-		<5.00	
8260C	NAPHTHALENE	µg/L	8.9	**1.52**	J	<2.50		**0.188**	JB	<2.50		<2.50		-		-		-		-		<2.50	
8260C	1,2,4-TRIMETHYLBENZENE	µg/L	28	<0.500		<0.500		**0.151**	J	<0.500		<0.500		-		-		-		-		<0.500	
Semivolatile Organic Compounds (SVOCs)																							
8270D	ACENAPHTHENE	µg/L	30	<1.00		<1.00		**32**		<1.00		-		<1.00		<1.00		-		<1.00		**15.9**	
8270D	ANTHRACENE	µg/L	100	<1.00		<1.00		<1.00		<1.00		-		<1.00		**0.361**	J	-		<1.00		<1.00	
8270D	FLUORENE	µg/L	10	<1.00		<1.00		**19.1**		<1.00		-		<1.00		<1.00		-		<1.00		<1.00	
8270D	NAPHTHALENE	µg/L	8.9	**0.801**	J J3	<1.00	J3	<1.00		<1.00		-		<1.00		<1.00		-		<1.00		<1.00	
8270D	PHENANTHRENE	µg/L	100	<1.00	J4	<1.00	J4	**14.1**		<1.00		-		<1.00		<1.00		-		<1.00		<1.00	
8270D	3&4-METHYL PHENOL	µg/L	400	**0.599**	J	<10.0		<10.0		<10.0		-		<10.0		<10.0		-		<10.0		<10.0	
8270D	PHENOL	µg/L	70,000	**18.5**		**11.6**		**1.29**	J	**2.89**	J	-		**1.40**	J	**9.50**	J	-		**1.34**	J	**3.08**	J
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)																							
8270SIM	TEQ: ND=1/2DL	µg/L	0.015	**0.14**		**0.008**		**0.008**		**0.008**		**0.007**		**0.02**		**0.007**		-		**0.008**		**0.008**	
Polychlorinated Biphenyls (PCBs)																							
1668A	Total PCBs	pg/L	7.0	**17,600**		**174**		-		-		**8,790**		**29,800**		**16,100**		**125**		**286**		**164**	
1668A	TEQ: ND=1/2DL	pg/L	1.3	**0.39**		**0.11**		-		-		**0.15**		**0.13**		**0.15**		**0.15**		**0.092**		**0.043**	
Dioxins and Furans																							
8290A	TEQ: ND=1/2DL	pg/L	63	-		-		-		-		-		-		-		-		**1.9**		-	

Notes:

Bold indicates measured above the laboratory reporting limit

Gray shading indicates measured above Preliminary Cleanup Level (PCL)

<2.0 indicates measured less than laboratory reporting limit of 2.0

a - PCL selection process and sources identifed in Table 4

Laboratory qualifiers are defined in laboratory reports (Appendix B) and analyzed in laboratory data review documents (Appendix C).

Table 3
Soil PCLs
2019 Data Gap Assessment
Former E.A. Nord
Everett, WA

	CLARC Values from May 2019								
	Soil Protective of Groundwater		Soil, Method A	Soil Protective of Human Direct Contact^e	Soil Protective of Terrestrial Species	Natural Background Concentration	Laboratory PQL	Selected PCLs - Human Health and Groundwater Protection	
	Unsaturated Soil	Saturated Soil		Soil, Method B				PCL	Source
	(gwl-u)	(gwl-s)	(mA)	(mB)	(TEE)	(back)			
Total Petroleum Hydrocarbons (TPH) (mg/kg)									
Diesel Range Hydrocarbons	-	-	2,000	-	200	-	4	200	(TEE)
Oil Range Hydrocarbons	-	-	2,000	-	-	-	10	2,000	(mA)
Volatile Organic Compounds (VOCs) (mg/kg)									
1,2,4-Trimethylbenzene	0.47	0.03	-	-	-	-	0.005	0.03	(gwl-s)
1,2,3-Trimethylbenzene	0.47	0.03	-	-	-	-	0.005	0.03	(gwl-s) (x)
Benzene	0.03	0.002	0.03	18	-	-	0.001	0.002	(gwl-s)
Ethylbenzene	6.1	0.34	6.0	8,000	-	-	0.0025	0.34	(gwl-s)
Tetrachloroethene (PCE)	0.05	0.003	0.05	476	-	-	0.0025	476	Direct
Toluene	4.7	0.27	7	6,400	200	-	0.005	0.27	(gwl-s)
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)									
Total cPAHs TEQ	7.5	0.37	-	3.4	12	-	0.005	0.37	(gwl-s)
Semi-Volatile Organics (SVOCs) (mg/kg)									
Acenaphthene	98	5.0	-	4,800	20	-	0.033	5.0	(gwl-s)
Anthracene	2,270	114	-	24,000	-	-	0.033	114	(gwl-s)
Benzo(g,h,i)perylene	655	33	-	2,400		-	0.033	2,400	Direct (y)
Fluoranthene	631	32	-	3,200	-	-	0.033	32	(gwl-s)
Fluorene	101	5.1	-	3,200	30	-	0.033	5.1	(gwl-s)
Naphthalene	4.5	0.24	5.0	1,600	-	-	0.033	0.24	(gwl-s)
Phenanthrene	2,270	114	-	24,000	-	-	0.033	24,000	Direct (z)
Pyrene	655	33	-	2,400	-	-	0.033	33	(gwl-s)
Benz(a)anthracene	0.86	0.04	-	1.4	-	-	0.006	NA	Calculated TEQ
Benzo(a)pyrene	2.3	0.12	0.10	0.14	12	-	0.006	NA	Calculated TEQ
Benzo(b)fluoranthene	2.95	0.15	-	1.4	-	-	0.006	NA	Calculated TEQ
Chrysene	96	4.8	-	140	-	-	0.006	NA	Calculated TEQ
Indeno(1,2,3-cd)pyrene	8.3	0.42	-	1.4	-	-	0.006	NA	Calculated TEQ
Polychlorinated Biphenyls (PCBs) (mg/kg)									
Total PCBs	-	-	1	0.5	0.65	0.0035	NA	0.0035	(back)
TEQ: ND=1/2 DL	-	-		-	-	-	2.00E-06	2.00E-06	(pql)
Dioxins/Furans (mg/kg)									
Total 2,3,7,8 TCDD (TEQ)	-	-	-	1.3E-05	2.0E-06	5.2E-06	3.80E-08	5.2E-06	(back)

Notes:
All values in miligrams per kilogram (mg/kg)
Gray shading indicates source value for PCL

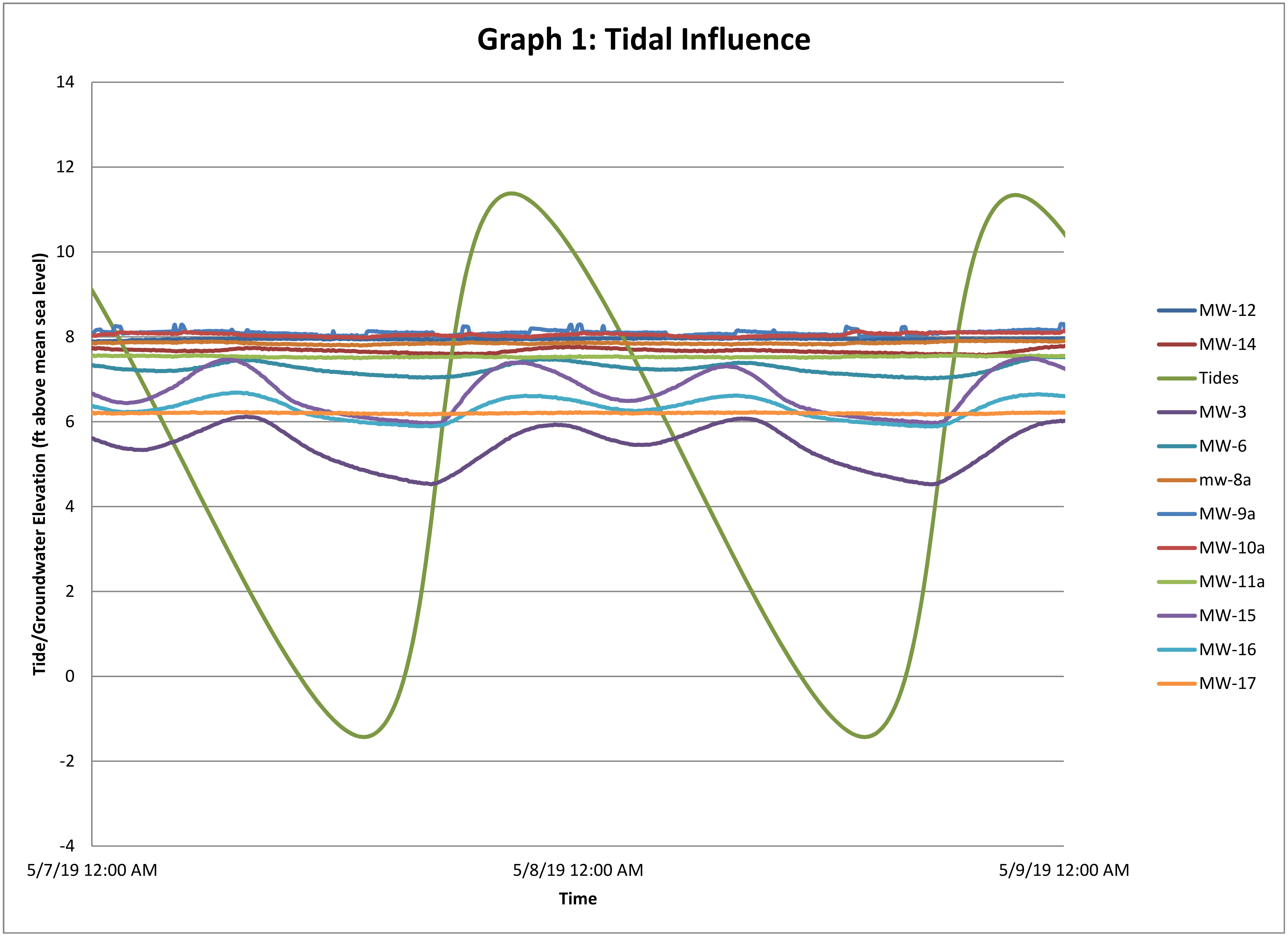
Explanation of Sources
gwl-s: Saturated Soil Concentration Protective of Leachability to Groundwater for Unrestricted Land Use
mA: Soil, Method A, Unrestricted Land Use, Table Value
Direct: Direct Contact (Per Ecology email dated July 14, 2014, direct contact value used if constituent not detected above the PCL in groundwater)
pql: Applicable Practical Quantitation Level (PQL)
TEE: Soil Protective of Terrestrial Species
back: Published background concentration
x: No CLARC values for compound, used 1,2,4-Trimethylbenzene as surrogate
y: No CLARC values for compound, used Pyrene as surrogate
z: No CLARC values for compound, used Anthracene as surrogate

Table 4
Groundwater PCLs
2019 Data Gap Assessment
Former E.A. Nord
Everett, WA

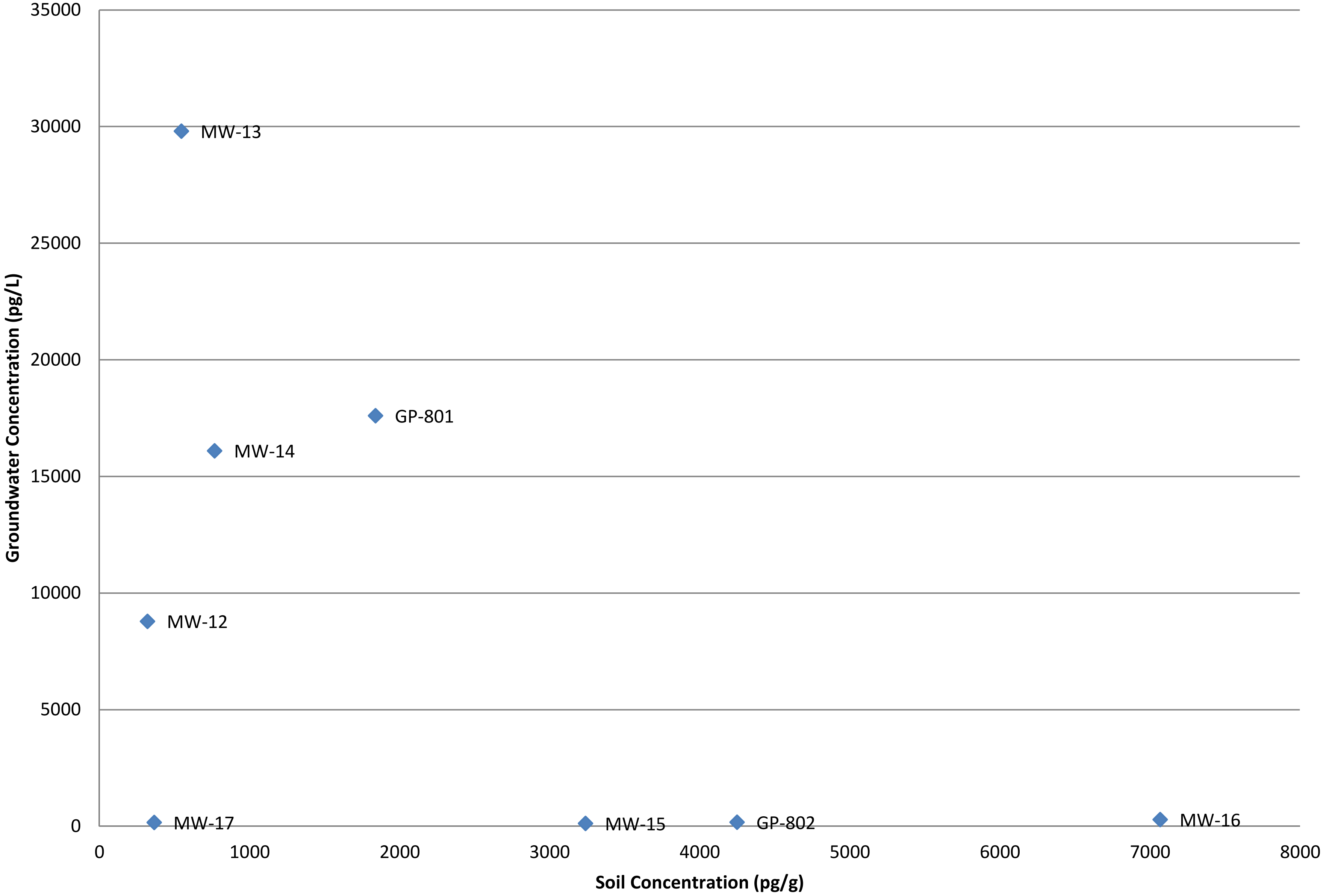
	CLARC Values - May 2019											
	Selection of Method B Surface Water Cleanup Levels						Potable Groundwater Screening Level		GW Protective of Vapor Intrusion - Method B, Unrestricted Land Use	Lab PQLs	Selected PCLs - 2019	
Analyte	SW ARAR - Marine/Chronic - Ch. 173-201A WAC	SW ARAR - Marine/Chronic - Clean Water Act §304	SW ARAR - Marine/Chronic - National Toxics Rule, 40 CFR 131	SW ARAR - Human Health – Marine – WA	SW ARAR - Human Health – Marine – EPA	SW, Human Health, Method B					Value	Source
	(ma-wac)	(ma-cwa)	(ma-ntr)	(hh-wac)	(hh-cwa)	(sw-b)	(pot)	Basis	(vi-b)	(pql)		
Total Petroleum Hydrocarbons (TPH)												
Diesel Range Hydrocarbons	-	-	-	-	-	-	500	-	-	200	500	(pot)
Oil Range Hydrocarbons	-	-	-	-	-	-	500	-	-	250	500	(pot)
Metals												
Antimony	-	-	-	180	90	1,040	6.0	(mcl)	-	2	90	(hh-cwa)
Arsenic	36	36	36	10	0.14	0.098	5.0	(gw-a)	-	2	5.0	(back)
Chromium (Total)	-	-	-	-	-	243,060	50	(gw-a)	-	2	243,060	(sw-b)
Copper	3.1	3.1	2.4	-	-	2,880	640	(gw-b)	-	5	5	(pql)
Lead	8.1	8.1	8.1	-	-	-	15	(gw-a)	-	2	8.1	(ma-wac)
Mercury	0.025	0.94	0.025	-	-	-	2	(gw-a)	0.89	0.2	0.2	(pql)
Nickel	8.2	8.2	8.2	190	100	1,100	100	(mcl)	-	2	8.2	(ma-wac)
Selenium	71	71	71	480	200	2,700	50	(mcl)	-	2	71	(ma-wac)
Zinc	81	81	81	2,900	1,000	16,500	4,800	(gw-b)	-	25	81	(ma-wac)
Volatile Organic Compounds (VOCs)												
1,2,4-Trimethylbenzene	-	-	-	-	-	-	-	-	28	0.5	28	(vi-b)
Acetone	-	-	-	-	-	-	7,200	(gw-b)	-	25	7,200	(gw-b)
Carbon Disulfide	-	-	-	-	-	-	800	(gw-b)	400	0.5	400	(vi-b)
Benzene	-	-	-	1.6	1.6	22.7	5	(gw-a)	2.4	0.5	1.6	(hh-wac)
Chloroform	-	-	-	1,200	600	55	1.4	(gw-b)	1.2	0.5	1.2	(vi-b)
N-Hexane	-	-	-	-	-	-	480	(gw-b)	7.8	5	7.8	(vi-b)
p-Isopropyltoluene	-	-	-	-	-	-	-	-	-	0.5	0.5	(pql)
2-Butanone (MEK)	-	-	-	-	-	-	4,800	(gw-b)	1,740,000	5	1,740,000	(vi-b)
Naphthalene	-	-	-	-	-	4,710	160	(gw-a)	8.9	2.5	8.9	(vi-b)
Polycyclic Aromatic Hydrocarbons (PAHs)												
Acenaphthene	-	-	-	110	30	648	960	(gw-b)	-	1	30	(hh-cwa)
Anthracene	-	-	-	4,600	100	25,900	4800	(gw-b)	-	1	100	(hh-cwa)
Fluorene	-	-	-	610	10	3,460	640	(gw-b)	-	1	10	(hh-cwa)
Naphthalene	-	-	-	-	-	4,710	160	(gw-a)	8.9	1	8.9	(vi-b)
Phenanthrene	-	-	-	4,600	100	25,900	4800	(gw-b)	-	1	100	(hh-cwa)
Total cPAHs TEQ [e]	-	-	-	0.051	0.0004	0.69	-	-	-	0.015	0.015	(pql)
Semi-Volatile Organics (SVOCs)												
3,4-Methylphenol (m,p-cresol)	-	-	-	-	-	-	400	(gw-b)	-	10	400	(pot)
Phenol	-	-	-	200,000	70,000	556,000	2,400	(gw-b)	-	10	70,000	(hh-cwa)
Dioxins/Furans												
Total 2,3,7,8 TCDD (TEQ) [e]	-	-	-	6.4E-08	1.4E-08	1.0E-08	1.12E-05	(gw-b)	-	5.70E-05	5.70E-05	(pql)
Polychlorinated Bipheyls (PCBs)												
Total PCBs	0.003	0.003	0.003	-	7.0E-06	1.1E-04	0.10	(gw-a)	-	-	7.0E-06	(hh-cwa)

Notes:
All values in micrograms per liter (µg/L)
Gray shading indicates source value for PCL

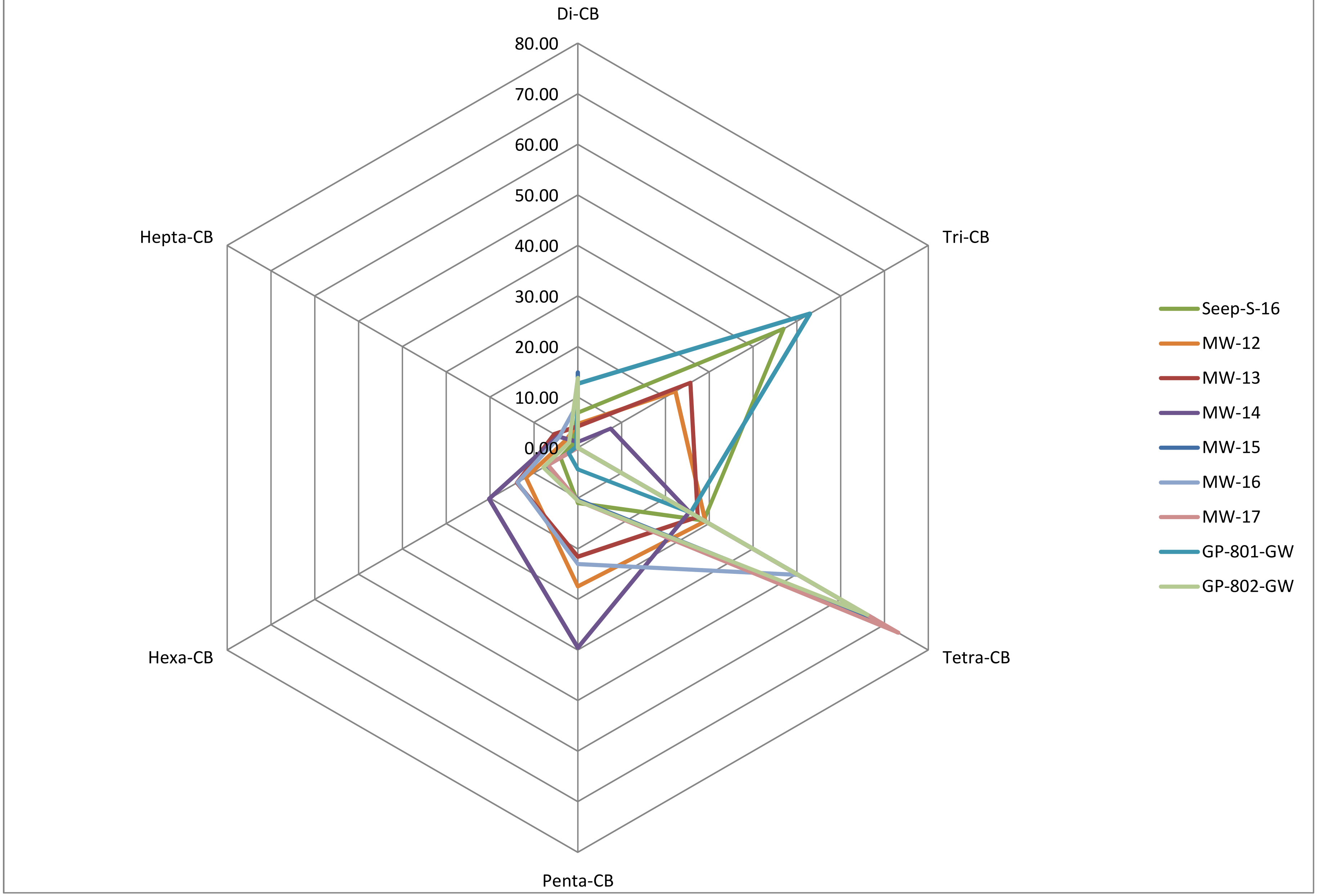
GRAPHS


Graph 1: Tidal Influence
Tide/Groundwater Elevation (ft above mean sea level)
14
12
10
8
6
4
2
0
-2
-4
5/7/19 12:00 AM
5/8/19 12:00 AM
5/9/19 12:00 AM
Time
MW-12
MW-14
Tides
MW-3
MW-6
mw-8a
MW-9a
MW-10a
MW-11a
MW-15
MW-16
MW-17

Graph 2: Total PCB Congener - Soil vs Groundwater



Graph 3: PCB Congener Groupings



APPENDIX A

Field Notes

FLUID MEASUREMENT FIELD DATA FORM

SHEET: 1 OF 1

DATE: 5/3/19

PROJECT # 108.00228.00059

PROJECT LOCATION Everett, WA

Water Level Measurement Instrument:

Product Detection Instrument: N/A

Equipment Decon: ☒ Alconox Wash ☐ Distilled Water ☒ Tap Water Final Rinse ☐ Tap Water Wash ☐ Hexane Wash ☐ Liquinox Wash ☐ Air Dry

Well ID	Depth to Product Below TOC	Depth to Water Below TOC	Well Depth	Product Thickness	Time
MW-11A	N/A	4.33	12.92	N/A	0913
MW-11B	N/A	4.08 SL	41.03	SL N/A	0916
MW-12	N/A	~~14.76~~ 21.69	~~25.19~~ 26.80	N/A	0855
MW-13	N/A	20.70 SL	26.67	SL N/A	0849
MW-14	N/A	~~21.69~~ 18.76	~~26.80~~ 25.19	N/A	0852
MW-15	N/A	5.60	13.04	N/A	0909
MW-16	N/A	6.29	12.88	N/A	0901
MW-17	N/A	5.97	12.99	N/A	0905

Prepared by: Steven Losleben

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. 108.00228.00059
Purged By: SML
Well I.D.: MW-11A
Project Name: Former E.A. Nord Inc. and as through its successor [illegible] Inc.
Sampled By: SML
Sample I.D.: MW-11A-0519
Location: Everett, WA
QA Samples: -0-

Date Purged: 5/3/19
Start (2400hr): 1516
End (2400hr): 1537
Date Sampled: 5/3/19
Sample Time (2400hr): 1537

Casing Diameter:	2" X	3"	4"	5"	6"	8"	Other
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 12.92
Casing Volume (gal) =
Depth to water (feet from TOC) = 4.33
Minimum Purge (gal) =
Water column height (feet) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1516	14.21	0.768	0.499	82.1	6.81	15.1	clear	clear
0.25	1519	13.48	0.803	0.522	3.08	6.58	-26.1	clear	clear
0.5	1522	13.51	0.812	0.528	1.74	6.55	-31.6	clear	clear
0.75	1525	13.49	0.806	0.524	1.08	6.54	-38.9	clear	clear
1.0	1528	13.45	0.800	0.526	0.86	6.65	-49.8	clear	clear
1.25	1531	13.50	0.801	0.521	0.72	6.64	-56.3	clear	clear
1.5	1534	13.48	0.805	0.523	0.67	6.66	-61.3	clear	clear
1.75	1537	13.46	0.804	0.523	0.63	6.65	-63.1	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
Other: ___
Pump Intake Depth: 8.0' (feet)

___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing

SAMPLE VESSELS

___ 40mL VOA
3 40mL VOA w/ HCL [illegible]
2 100 mL amber glass [illegible]
___ ___ mL amber glass w/ HCl
___ ___ mL HDPE
1 250 mL HDPE w/ HNO3 [illegible]

___ ___ mL HDPE w/ H2SO4
2 500 mL amber ARI
2 1000 mL amber [illegible]

Well Integrity: Good
Odor: No
Remarks: N/A
Tide Status: Low: 0.81 @ 1102; High: 10.05 @ 1739
Reference: NOAA

Signature:

Page 1 of 1

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. 108.00224.00059
Purged By: SML
Well I.D.: MW-11B
Project Name: Former E.A. Nord Inc. and as through JELD-WEN, Inc.
Sampled By: SML
Sample I.D.: MW-11B-0519
Location: Everett, WA
QA Samples: -0-

Date Purged: 5/3/19
Start (2400hr): 1556
End (2400hr): 1617
Date Sampled: 5/3/19
Sample Time (2400hr): 1617

Casing Diameter:	2" X	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 41.03
Depth to water (feet from TOC) = 4.08
Water column height (feet) =
Casing Volume (gal) =
Minimum Purge (gal) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1556	14.06	1.117	0.764	7.21	7.67	19.2	clear	clear
0.25	1559	14.08	1.247	0.811	1.30	8.13	13.0	clear	clear
0.5	1602	14.12	1.279	0.833	0.97	8.24	10.1	clear	clear
0.75	1605	14.20	1.303	0.849	0.78	8.29	7.9	clear	clear
1.0	1608	14.16	1.314	0.854	0.69	8.37	6.5	clear	clear
1.25	1611	14.16	1.312	0.853	0.64	8.32	5.8	clear	clear
1.5	1614	14.18	1.316	0.856	0.64	8.34	5.9	clear	clear
1.75	1617	14.26	1.312	0.853	0.60	8.38	5.7	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing
Other: ___
Pump Intake Depth: 25.0 (feet)

SAMPLE VESSELS

2 40mL VOA ESC
5 40mL VOA w/ HCL ESC
2 100 mL amber glass ESC
___ ___ mL amber glass w/ HCl
___ ___ mL HDPE
___ ___ mL HDPE w/ HNO3
___ ___ mL HDPE w/ H2SO4
2 500 mL amber ALS
1 [illegible] mL amber ALS

Well Integrity: Good
Odor: No
Remarks: NA
Tide Status: Low: 0.61 @ 1102; High: 11.05 @ 1729
Reference: NOAA

Signature:

Page 1 of 1

GW Sample Data Sheet - Low Flow.doc

SLR International Corp

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. 108.00228.00059
Purged By: SML
Well I.D.: MW-12
Project Name: Former E.A. Nord Inc. and as through its successor JELD-WEN Inc
Sampled By: SML
Sample I.D.: MW-12-0519
Location: Everett, WA
QA Samples: 0

Date Purged: 5/3/19
Start (2400hr): 1056
End (2400hr): 1120
Date Sampled: 5/3/19
Sample Time (2400hr): 1120

Casing Diameter:	2" X	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = ~~25.19~~ 21.69 SL
Depth to water (feet from TOC) = ~~14.76~~ 26.80 SL
Water column height (feet) =
Casing Volume (gal) =
Minimum Purge (gal) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1056	11.86	2.045	1.320	3.42	10.40	-89.9	clear	Dark hue
0.25	1059	11.62	1.986	1.291	1.57	10.56	-138.5	clear	Dark hue
0.5	1102	11.65	1.990	1.293	1.23	10.38	-162.1	clear	dark hue
0.75	1105	11.67	2.000	1.300	1.15	10.22	-186.3	clear	dark hue
1.0	1108	11.70	2.011	1.307	1.07	10.15	-199.0	clear	dark hue
1.25	1111	11.73	2.033	1.322	1.08	10.06	-214.8	clear	dark hue
1.50	1114	11.72	2.072	1.347	1.06	9.93	-232.8	clear	dark hue
1.75	1117	11.76	2.116	1.377	1.02	9.89	-248.9	clear	dark hue
2.0	1120	11.79	2.115	1.402	0.94	9.79	-255.5	clear	dark hue

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing
Other:
Pump Intake Depth: 23 (feet)

SAMPLE VESSELS

___ 40mL VOA
3 40mL VOA w/ HCL ESC
___ ___mL amber glass
___ ___mL amber glass w/ HCl
___ ___mL HDPE
1 250mL HDPE w/ HNO3 ESC
___ ___mL HDPE w/ H2SO4
2 500 mL amber ARI
2 1000 mL amber SGS

Well Integrity: Good
Odor: organic-like odor / sulfur-like
Remarks: N/A
Tide Status: Low: 0.81 @ 1102; High: 10.05 @1739
Reference: NOAA

Signature: Steve

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SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. 108.00228.00059
Purged By: SML
Well I.D.: MW-13
Project Name: Former E.A. Nord Inc and as through its successor JELD-WEN Inc.
Sampled By: SML
Sample I.D.: MW-13-0519
Location:
QA Samples: 0

Date Purged: 5/3/19
Start (2400hr): 1001
End (2400hr): 1025
Date Sampled: 5/3/19
Sample Time (2400hr): 1025

Casing Diameter:	2" ✓	3"	4"	5"	6"	8"	Other
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 26.67
Casing Volume (gal) =
Depth to water (feet from TOC) = 20.70
Minimum Purge (gal) =
Water column height (feet) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1001	11.90	3.872	2.498	8.23	8.43	138.8	clear	clear
0.25	1004	11.60	3.744	2.458	3.28	8.55	121.4	clear	clear
0.5	1007	11.54	3.737	2.429	1.97	8.57	116.8	clear	clear
0.75	1010	11.54	3.732	2.426	1.83	8.54	116.0	clear	clear
1.0	1013	11.58	3.703	2.407	1.46	8.58	115.1	clear	clear
1.25	1016	11.61	3.696	2.402	1.37	8.57	114.6	clear	clear
1.5	1019	11.64	3.686	2.392	1.16	8.57	113.5	clear	clear
1.75	1022	11.65	3.665	2.382	1.10	8.55	112.7	clear	clear
2.0	1025	11.72	3.656	2.377	1.02	8.53	112.8	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
Other:
Pump Intake Depth: 23.0 (feet)
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing

SAMPLE VESSELS

6 40mL VOA ESC
___ 40mL VOA w/ HCL
2 100 mL amber glass ESC
___ ___ mL amber glass w/ HCl
___ ___ mL HDPE
2 250 mL HDPE w/ HNO3 ESC
___ ___ mL HDPE w/ H2SO4
2 1000ml amber glass SGS
2 500ml amber glass ARI

Well Integrity: Good
Odor: No
Remarks: NA
Tide Status: Low: 0.81' @ 1102 ; High: 10.05' @ 1739 Reference: NOAA

Signature:

Page 1 of 1

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. 108.00226.00059
Purged By: SML
Well I.D.: MW-14
Project Name: Former E.A. Nord Inc. and as through its successor JELD-WEN, Inc
Sampled By: SML
Sample I.D.: MW-14-0519
Location: Everett, WA
QA Samples: 0

Date Purged: 5/3/19
Start (2400hr): 1146
End (2400hr): 1207
Date Sampled: 5/3/19
Sample Time (2400hr): 1207

Casing Diameter:	2" X	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = ~~26.40~~ 25.19 SL
Depth to water (feet from TOC) = ~~21.69~~ 18.76 SL
Water column height (feet) =
Casing Volume (gal) =
Minimum Purge (gal) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1146	12.26	7.951	5.166	6.40	7.24	-42.4	clear	dark hue
0.25	1149	12.11	7.792	5.064	1.41	7.10	-57.4	clear	dark hue
0.5	1152	12.08	7.745	5.030	1.29	7.07	-64.7	clear	dark hue
0.75	1155	12.07	7.664	4.981	1.88	7.05	-75.8	clear	dark hue
1.0	1158	12.15	7.612	4.949	1.06	7.05	-83.5	clear	dark hue
1.25	1201	12.13	7.600	4.946	0.93	7.05	-87.6	clear	dark hue
1.5	1204	12.13	7.597	4.939	0.88	7.03	-89.1	clear	dark hue
1.75	1207	12.18	7.606	4.945	0.84	7.04	-91.2	clear	dark hue

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated Tubing
Other:
Pump Intake Depth: 23.75 (feet)

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 100 mL amber glass ESC
___ ___ mL amber glass w/ HCl
___ ___ mL HDPE
1 250 mL HDPE w/ HNO3 ESC
___ ___ mL HDPE w/ H2SO4
2 500 mL amber ARI
2 1000 mL amber SGS

Well Integrity: Good
Odor: No
Remarks: N/A
Tide Status: Low: 0.81' @ 1102; High: 10.05' @ 1739
Reference: NOAA

Signature:

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LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. 108.00228.00059
Purged By: SML
Well I.D.: MW-15
Project Name: Former E.A Nord Inc. and as through its successor JELD-WEN, Inc.
Sampled By: SML
Sample I.D.: MW-15-0519
Location: Everett, WA
QA Samples: 0

Date Purged: 5/3/19
Start (2400hr): 1251
End (2400hr): 1315
Date Sampled: 5/3/19
Sample Time (2400hr): 1315

Casing Diameter:	2" X	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 13.04
Casing Volume (gal) =
Depth to water (feet from TOC) = 5.60
Minimum Purge (gal) =
Water column height (feet) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1251	14.04	14.81	9.674	23.78	7.16	-101.7	clear	clear
0.25	1254	12.42	15.01	9.766	3.26	6.82	-191.8	clear	clear
0.5	1257	12.29	15.17	9.861	2.10	6.81	-236.5	clear	clear
0.75	1300	12.23	15.18	9.864	1.43	6.80	-257.9	clear	clear
1.0	1303	12.25	15.15	9.450	0.92	6.77	-273.5	clear	clear
1.25	1306	12.23	15.21	9.887	0.99	6.77	-283.2	clear	clear
1.5	1309	12.23	15.26	9.927	0.80	6.77	-285.4	clear	clear
1.75	1312	12.24	15.22	9.892	0.83	6.77	-291.0	clear	clear
2.0	1315	12.35	15.20	9.876	0.91	6.76	-293.1	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
✓ Peristaltic Pump
Other: ___
Pump Intake Depth: 9.75' (feet)

___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
___ ___mL amber glass
___ ___mL amber glass w/ HCl
___ ___mL HDPE
1 250mL HDPE w/ HNO3 ESC

___ ___mL HDPE w/ H2SO4
2 1000 mL amber ESC

Well Integrity: Good
Odor: No
Remarks: N/A
Tide Status: Low: 0.81' @ 1102; High: 10.05' @ 1739
Reference: NOAA

Signature:

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GW Sample Data Sheet - Low Flow.doc

SLR International Corp

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. 108.00228.00059
Project Name: Former E.A. Nord Inc. and as through its successor JELD-WEN, Inc.
Location: Everett, WA
Purged By: SML
Sampled By: SML
Well I.D.: MW-16
Sample I.D.: MW-16-0519
QA Samples: 0

Date Purged: 5/3/19
Date Sampled: 5/3/19
Start (2400hr): 1333
End (2400hr): 1357
Sample Time (2400hr): 1357

Casing Diameter:	2" X	3"___	4"___	5"___	6"___	8"___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 12.88
Depth to water (feet from TOC) = 6.29
Water column height (feet) =
Casing Volume (gal) =
Minimum Purge (gal) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1333	16.00	1.171	0.748	12.30	6.47	-93.9	clear	clear
0.25	1336	12.98	0.589	0.371	2.24	7.69	-75.7	clear	clear
0.5	1339	12.96	0.439	0.285	1.84	7.48	-62.3	clear	clear
0.75	1342	12.96	0.440	0.286	1.72	7.35	-61.0	clear	clear
1.0	1345	13.04	0.441	0.287	1.16	7.24	-53.0	clear	clear
1.25	1348	13.06	0.436	0.284	0.93	7.22	-49.4	clear	clear
1.5	1351	12.88	0.447	0.291	0.93	7.16	-44.8	clear	clear
1.75	1354	12.95	0.444	0.288	0.85	7.15	-43.2	clear	clear
2.0	1357	13.00	0.443	0.288	0.95	7.12	-43.5	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing
Other:
Pump Intake Depth: 9.75 (feet)

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 100 mL amber glass ESC
___ ___mL amber glass w/ HCl
___ ___mL HDPE
1 250 mL HDPE w/ HNO3 ESC
___ ___mL HDPE w/ H2SO4
2 500 mL amber ARI
2 1000 mL amber SGS

Well Integrity: Good
Odor: No
Remarks: NA
Tide Status: Low: 0.81 @ 1102; High: 10.05 @ 1739
Reference: NOAA

Signature:

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SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. 105.00778.00009
Purged By: SML
Well I.D.: MW-17
Project Name: Former E.A Nord, Inc. and as through its successor JELD-WEN, Inc.
Sampled By: SML
Sample I.D.: MW-17-0519
Location: Everett, WA
QA Samples: 0

Date Purged: 5/3/19
Start (2400hr): 1423
End (2400hr): 1444
Date Sampled: 5/3/19
Sample Time (2400hr): 1444

Casing Diameter:	2" X	3"___	4"___	5"___	6"___	8"___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet from TOC) = 12.99
Casing Volume (gal) =
Depth to water (feet from TOC) = 5.97
Minimum Purge (gal) =
Water column height (feet) =
Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
0	1423	14.46	0.606	0.394	10.77	6.83	6.1	clear	clear
0.25	1426	14.18	0.607	0.391	4.05	6.66	-29.6	clear	clear
0.5	1429	14.16	0.603	0.392	2.63	6.68	-41.1	clear	clear
0.75	1432	14.19	0.609	0.394	1.74	6.67	-57.8	clear	clear
1.0	1435	14.16	0.606	0.394	1.20	6.56	-64.8	clear	clear
1.25	1438	14.18	0.608	0.395	1.08	6.57	-77.1	clear	clear
1.5	1441	14.16	0.608	0.396	1.02	6.61	-83.0	clear	clear
1.75	1444	14.15	0.608	0.395	0.97	6.65	-90.9	clear	clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
X Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
X Dedicated tubing
Other:
Pump Intake Depth: 10.0 (feet)

SAMPLE VESSELS

2 40mL VOA ESC
5 40mL VOA w/ HCL ESC
2 100 mL amber glass ESC
___ ___ mL amber glass w/ HCl
___ ___ mL HDPE
1 250 mL HDPE w/ HNO3 ESC
___ ___ mL HDPE w/ H2SO4
2 500 mL amber ARI
2 1000 mL amber SGS

Well Integrity: Good
Odor: No
Remarks: N/A
Tide Status: Low: 0.81 @ 1102; High: 10.05 @ 1739
Reference: NOAA

Signature:
Page of

SLR
22118 20th Ave. SE, Suite G-202
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

WELL NUMBER MW-11A

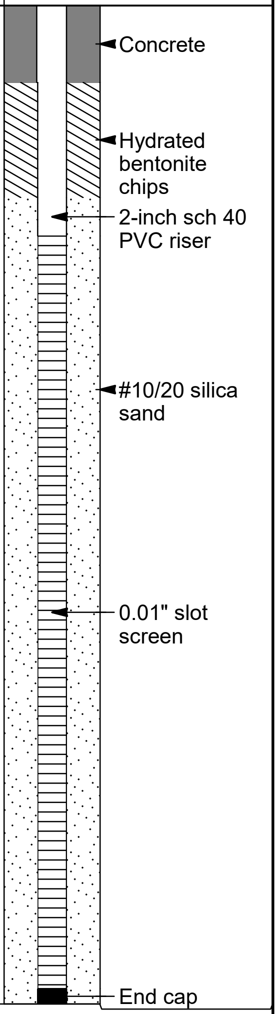
CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.39 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %
0 to 5	☒	Direct Push		80
5 to 10	☒	Direct Push	GP-MW-11-SS*	100
10 to 13	☒	Direct Push		100

DEPTH (ft)	U.S.C.S.	MATERIAL DESCRIPTION	Elevation
0.3		**ASPHALT PAVEMENT**	12.1
5.5 ▼	SW	**SAND**, gray, fine to coarse grained, moist, no odor	6.9
7.0	SP	**SAND**, gray, fine to medium grained, wet, no odor	5.4
8.0	ML	**SILT**, brown-gray with some mottling, trace organic debris, moist, no odor	4.4
13.0	SP	**SAND**, gray, fine to medium grained, trace fine gravel, wet, no odor	-0.6

PID (ppm)
0.1
0.0
0.0
0.0
0.6

WELL DIAGRAM



WELL COMPLETION DETAILS:

0.0 to 1.0 feet: Concrete.
1.0 to 2.5 feet: Hydrated bentonite chips.
2.5 to 13.0 feet: 10x20 silica sand pack.

REMARKS

Boring continued to 40.0 feet bgs. (description included in boring log for MW-11B)
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

(Continued Next Page)

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Fax: 425.402.8488

WELL NUMBER MW-11A

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.39 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM

0.0 to 3.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
3.0 to 12.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
12.8 to 13.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring continued to 40.0 feet bgs. (description included in boring log for MW-11B)
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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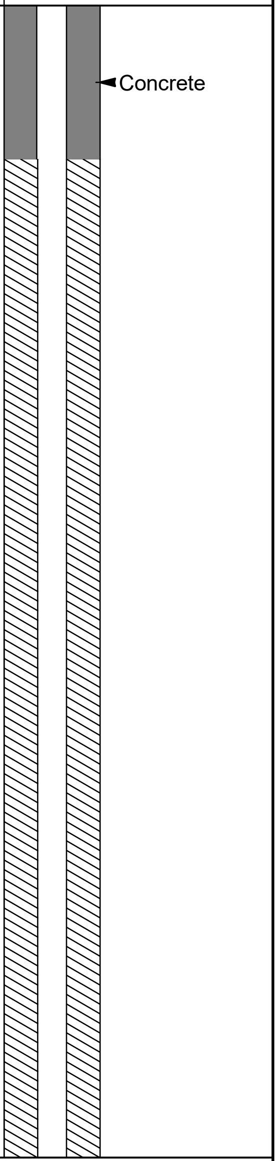
WELL NUMBER MW-11B

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.39 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Direct Push		80			0.3 **ASPHALT PAVEMENT** 12.1	
					SW		**SAND**, gray, fine to coarse grained, moist, no odor	0.1
								0.0
5		Direct Push		100			5.5 ▼ 6.9	
					SP		**SAND**, gray, fine to medium grained, wet, no odor	0.0
							7.0 5.4	
					ML		**SILT**, brown-gray with some mottling, trace organic debris, moist, no odor	
							8.0 4.4	
					SP		**SAND**, gray, fine to medium grained, trace fine gravel, wet, no odor	0.0
10		Direct Push		100				0.6
							13.0 -0.6	
					ML		**SILT**, gray, wet, no odor	0.3
							14.0 -1.6	
					SP		**SAND**, gray, fine to medium grained, trace fine gravel, wet, no odor	
15								

WELL DIAGRAM



REMARKS

Boring completed at 40.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.

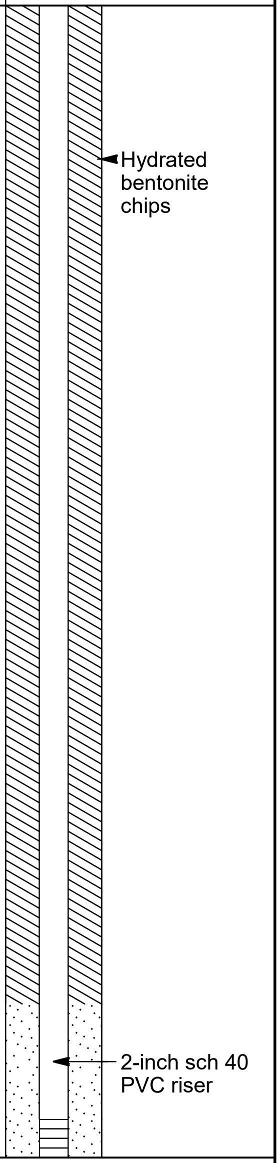
(Continued Next Page)

WELL NUMBER MW-11B

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.39 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
15	⊠	Direct Push		100	SP	⁘	**SAND**, gray, fine to medium grained, trace fine gravel, wet, no odor *(continued)*	0.2 0.0
20	⊠	Direct Push		90	SP	⁘		0.0 0.2
25	⊠	Direct Push		100	SP	⁘		0.1 0.0
30								

WELL DIAGRAM



REMARKS

Boring completed at 40.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.

(Continued Next Page)

SLR
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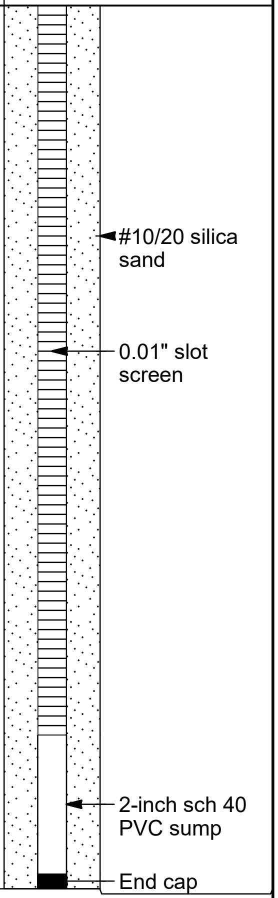
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

WELL NUMBER MW-11B

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.39 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
30		Direct Push		100	SP		**SAND**, gray, fine to medium grained, trace fine gravel, wet, no odor *(continued)*	0.2 0.1
35		Direct Push		100				0.1
38.5					SM		-26.1 **SILTY SAND with GRAVEL**, gray, fine grained, little silt, few fine gravel, wet, no odor	0.0
40.0							-27.6	



WELL COMPLETION DETAILS:

0.0 to 2.0 feet: Concrete.
2.0 to 28.0 feet: Hydrated bentonite chips.
28.0 to 41.5 feet: 10x20 silica sand pack.

0.0 to 29.5 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
29.5 to 39.5 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
39.5 to 41.3 feet: 2"-diameter, flush-threaded Sch. 40 PVC sump.
41.3 to 41.5 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

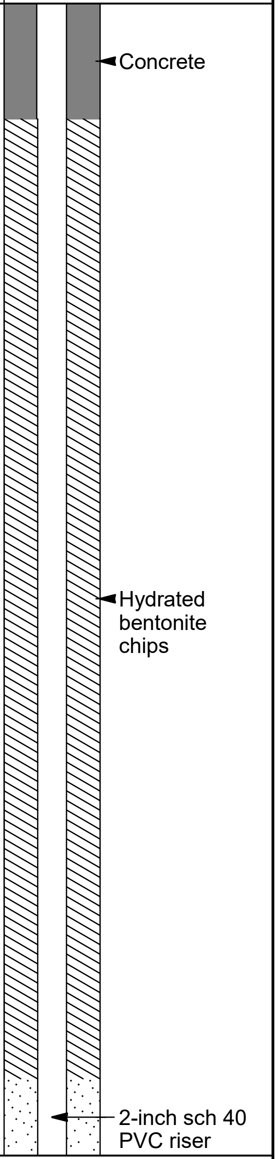
Boring completed at 40.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.

WELL NUMBER MW-12

CLIENT JELD-WEN, Inc.		**PROJECT NAME** Former E.A. Nord Door, Inc.	
PROJECT NUMBER 108.00228.00059		**PROJECT LOCATION** 300 West Marine View Drive, Everett, WA	
DATE STARTED 4/25/19	**COMPLETED** 4/30/19	**GROUND ELEVATION** 29.66 ft	**HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling		**GROUND WATER LEVELS:**	
DRILLING METHOD Direct Push		▼ **AT TIME OF DRILLING** 19.0 ft	
LOGGED BY S. Losleben	**CHECKED BY** C. Kramer	**AFTER DRILLING** N/A	
NOTES			

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Direct Push		40	SM		**ORGANIC SILTY SAND** dark brown, fine grained, some silty fines, trace fine gravel, trace root debris, moist, no odor	
0.5					SP		29.2 **SAND**, brown-gray, fine grained, abundant shell fragments, moist, no odor	NT 0.1
5		Direct Push	GP-MW-12-SS*	50				NT 0.0
10		Direct Push		100			@ 12.5 feet bgs: Becomes dark gray	0.4 0.7
15								

WELL DIAGRAM



REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

(Continued Next Page)

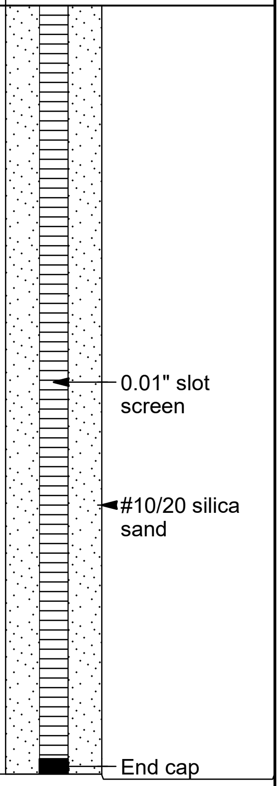
WELL NUMBER MW-12

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/30/19
GROUND ELEVATION 29.66 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 19.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
15		Direct Push		100	SP		**SAND**, brown-gray, fine grained, abundant shell fragments, moist, no odor *(continued)*	1.5
17.0					SP		**SAND**, black-gray, fine to coarse grained, trace fine to coarse gravel, moist, no odor	
18.5						△ △ △	▼ **ROCK FRAGMENTS**, gray and dark gray, pulverized rock debris	2.9
19.5					ML		**SANDY SILT**, gray, some fine sand, trace native wood debris	
20		Direct Push		100				0.4
23.0					SP		**SAND**, black-gray, fine to coarse grained, few silty fines, abundant decomposing native wood and organic debris, wet, organic-like odor	18.9
25 / 25.0								

Elevations at layer boundaries: 17.0 – 12.7; 18.5 – 11.2; 19.5 – 10.2; 23.0 – 6.7; 25.0 – 4.7

WELL DIAGRAM



WELL COMPLETION DETAILS:

0.0 to 1.5 feet: Concrete.
1.5 to 14.0 feet: Hydrated bentonite chips.
14.0 to 25.0 feet: 10x20 silica sand pack.

0.0 to 15.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
15.0 to 24.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
24.8 to 25.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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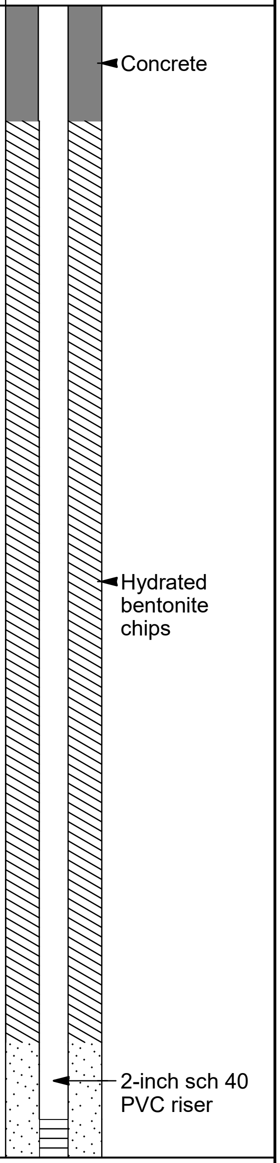
WELL NUMBER MW-13

PAGE 1 OF 2

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 4/30/19
GROUND ELEVATION 28.68 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 18.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Direct Push		40	SM SP		0.3 **ORGANIC SILTY SAND**, dark brown, fine grained, some silty fines, some organics, moist, no odor 28.4 **SAND**, brown-gray, fine grained, abundant shell fragments, trace native wood debris, moist, no odor	28.4 NT 0.0
5		Direct Push	GP-MW-13-SS*	80	SP			0.0 0.0
10		Direct Push		80			@ 10.0 feet bgs: Becomes dark gray	0.5 3.8
15								

WELL DIAGRAM



REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-13

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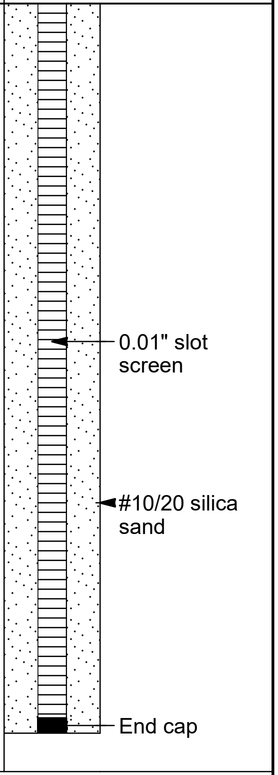
CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19
COMPLETED 4/30/19
GROUND ELEVATION 28.68 ft
HOLE SIZE 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 18.0 ft
LOGGED BY S. Losleben
CHECKED BY C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
15		Direct Push		50	SP		**SAND**, brown-gray, fine grained, abundant shell fragments, trace native wood debris, moist, no odor *(continued)*	NT
							▼ @ 18.0 feet bgs: Becomes wet	1.5
							19.8 ——— 8.9	
20		Direct Push		10	SP		**SAND**, black-gray, fine to coarse grained, trace silt, abundant decomposing native wood debris, wet, no odor	NT
25							25.0 ——— 3.7	1.0

WELL DIAGRAM



WELL COMPLETION DETAILS:

0.0 to 1.5 feet: Concrete.
1.5 to 13.5 feet: Hydrated bentonite chips.
13.5 to 24.5 feet: 10x20 silica sand pack.

0.0 to 14.5 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
14.5 to 24.3 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
24.3 to 24.5 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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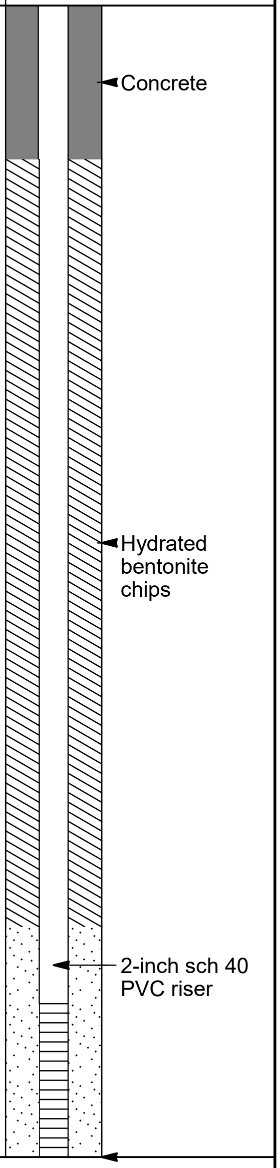
WELL NUMBER MW-14

PAGE 1 OF 2

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 5/1/19
GROUND ELEVATION 26.68 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 14.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Direct Push		75	SM		**ORGANIC SILTY SAND**, dark brown, fine grained, some silty fines, some organics, moist, no odor 0.5 — 26.2	
					SP		**SAND**, brown-gray, fine grained, abundant shell fragments, moist, no odor	0.0 0.5
5		Direct Push	GP-MW-14-SS*	75				0.3 0.2
10		Direct Push		95			▼ @ 14.0 feet bgs: becomes wet	0.5 0.3
15								

WELL DIAGRAM



REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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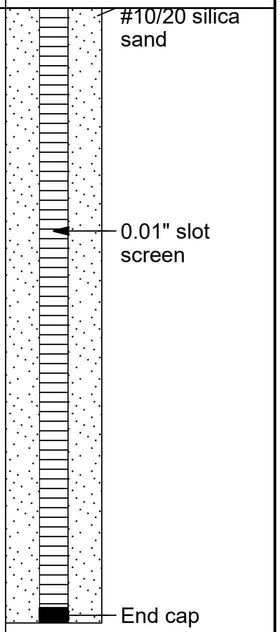
WELL NUMBER MW-14

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/25/19 **COMPLETED** 5/1/19
GROUND ELEVATION 26.68 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 14.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
15		Direct Push		90	SP		**SAND**, brown-gray, fine grained, abundant shell fragments, moist, no odor *(continued)*	3.0
					SP		17.0 9.7 **SAND with GRAVEL**, dark gray, coarse grained, few fine to coarse gravel, wet, no odor	
					GP		18.5 8.2 **GRAVEL**, black, orange, tan, fine to coarse grained, vesicular, wet, no odor, slag-like fill material	0.9
20		Direct Push		95				
							21.5 5.2 **WOOD**, dark brown-black, solid and fragmented native wood debris	0.8
					SP		23.5 3.2 **SAND interbedded with SILT**, gray, fine grained, few 4-inch silt lenses, moist, no odor	0.8
25							25.0 1.7	

WELL DIAGRAM



WELL COMPLETION DETAILS:

0.0 to 2.0 feet: Concrete.
2.0 to 12.0 feet: Hydrated bentonite chips.
12.0 to 23.0 feet: 10x20 silica sand pack.

0.0 to 13.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
13.0 to 22.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
22.8 to 23.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 25.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-15

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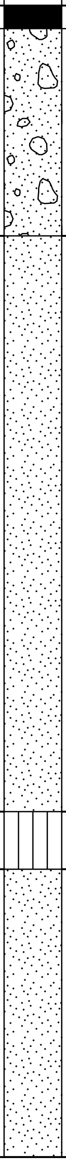
CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.24 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 6.0 ft
LOGGED BY C. Lee **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

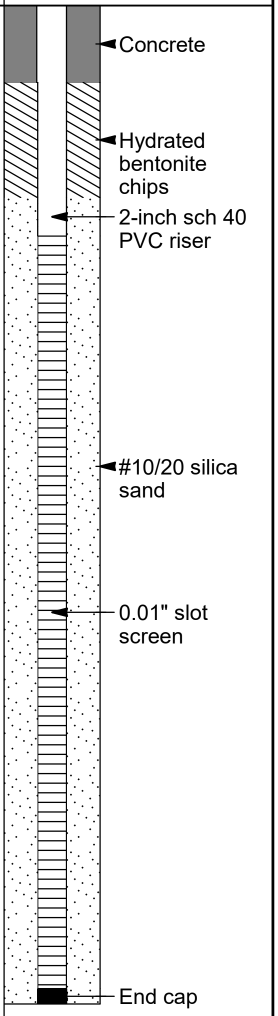
DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %
0–5		Direct Push		70
5–10		Direct Push	SB-MW-15-SS*	80
10–15		Direct Push		100



DEPTH (ft)	U.S.C.S.	MATERIAL DESCRIPTION	ELEVATION
0.3		**ASPHALT PAVEMENT**	11.9
3.0	SP	**GRAVELLY SAND**, brown, fine grained, some fine to medium gravel, moist, no odor, no staining	9.2
10.5	SP	**SAND**, dark gray, fine grained, few wood fragments, moist, no odor, no staining ▼ @ 6.0 feet: Becomes wet	1.7
11.3	ML	**SILT**, dark gray, trace wood debris, wet, no odor, no staining	1.0
15.0	SP	**SAND**, dark gray, fine grained, wet, no odor, no staining	-2.8

DEPTH (ft)	PID (ppm)
1	0.0
2	0.1
3	0.4
4	0.3
6	0.0
7	0.0
8	0.0
9	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0

WELL DIAGRAM



REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-15

CLIENT JELD-WEN, Inc.		**PROJECT NAME** Former E.A. Nord Door, Inc.	
PROJECT NUMBER 108.00228.00059		**PROJECT LOCATION** 300 West Marine View Drive, Everett, WA	
DATE STARTED 4/26/19	**COMPLETED** 4/29/19	**GROUND ELEVATION** 12.24 ft	**HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling		**GROUND WATER LEVELS:**	
DRILLING METHOD Direct Push		▼ **AT TIME OF DRILLING** 6.0 ft	
LOGGED BY C. Lee	**CHECKED BY** C. Kramer	**AFTER DRILLING** N/A	
NOTES			

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM

WELL COMPLETION DETAILS:

0.0 to 1.0 feet: Concrete.
1.0 to 2.5 feet: Hydrated bentonite chips.
2.5 to 13.0 feet: 10x20 silica sand pack.

0.0 to 3.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
3.0 to 12.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
12.8 to 13.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-16

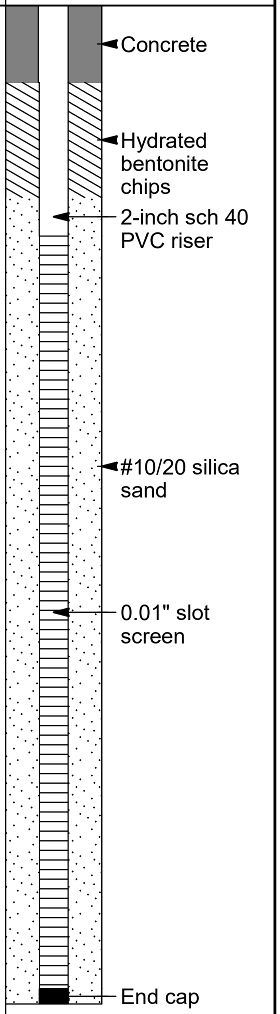
CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.89 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY C. Lee **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	TYPE	NAME	RECOVERY %
0 – 5	Direct Push		80
5 – 10	Direct Push	GP-MW-16-SS*	20
10 – 15	Direct Push		90

Depth (ft)	U.S.C.S.	MATERIAL DESCRIPTION	Elevation (ft)
0.2		**ASPHALT PAVEMENT**	12.7
2.0	GP	**GRAVEL**, gray, fine to coarse grained, few fine grained sand, moist, no odor, no staining	10.9
3.5	SP	**SAND with GRAVEL**, gray-brown, fine grained, few fine gravel, moist, no odor, no staining	9.4
4.3	GP	**GRAVEL**, gray, fine to coarse grained, few fine grained sand, few silty fines, moist, no odor, no staining	8.6
5.0	SP	**SAND with GRAVEL**, black, coarse grained, few fine gravel, moist, no odor, no staining	7.9
11.0	SM	▼ **SILTY SAND with GRAVEL**, gray, fine grained, some silty fines, few coarse gravel, moist, no odor @ 5.5 feet bgs: Becomes wet	1.9
12.0	SP	**SAND**, gray, fine grained, few silty fines, few wood debris, wet, no odor, no staining	0.9
13.5	ML	**SILT**, red-brown, few wood fragments, moist, no odor, no staining	-0.6
15.0	SP	**SAND**, gray, fine grained, wet, no odor, no staing	-2.1

Depth (ft)	PID (ppm)
1	0.5
2	1.5
3	0.7
4	0.4
5	0.3
6	0.0
12	0.0
13	0.0
14	0.0

WELL DIAGRAM



REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-16

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/29/19
GROUND ELEVATION 12.89 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.5 ft
LOGGED BY C. Lee **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM

WELL COMPLETION DETAILS:

0.0 to 1.0 feet: Concrete.
1.0 to 2.5 feet: Hydrated bentonite chips.
2.5 to 13.0 feet: 10x20 silica sand pack.

0.0 to 3.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
3.0 to 12.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
12.8 to 13.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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WELL NUMBER MW-17

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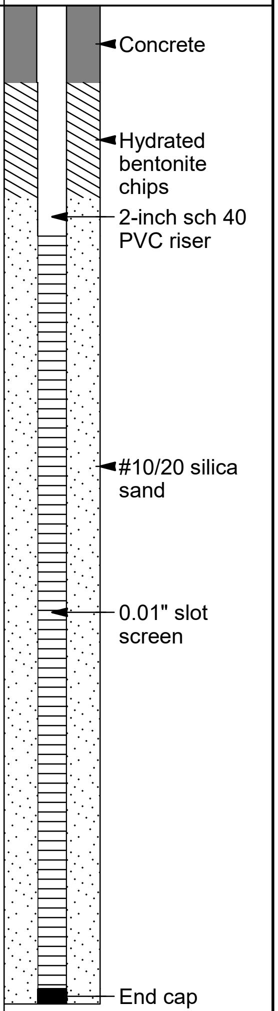
CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/30/19
GROUND ELEVATION 12.61 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 7.5 ft
LOGGED BY C. Lee **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	TYPE	NAME	RECOVERY %
0–5	Direct Push		75
5–10	Direct Push	GP-MW-17-SS*	100
10–15	Direct Push		100

DEPTH (ft)	U.S.C.S.	MATERIAL DESCRIPTION	Elevation (ft)
0.3		**ASPHALT PAVEMENT**	12.3
1.5	GP	**SANDY GRAVEL**, brown, medium to coarse grained, little fine sand, moist, no odor, no staining	11.1
8.0	SP	**SAND**, brown, fine grained, moist, no odor, no staining ▼ @ 7.5 feet bgs: Becomes wet	4.6
8.5	ML	**SILT**, dark gray, wet, no odor, no staining	4.1
9.0	SM	**SILTY SAND**, dark gray, fine grained, some silty fines, few wood debris, wet, no odor, no staining	3.6
15.0	SP	**SAND**, dark gray, fine grained, wet, no odor, no staining	-2.4

DEPTH (ft)	PID (ppm)
1.5	0.2
3.5	0.1
6.5	0.0
8.5	0.0
11.5	0.0
13.5	0.0

WELL DIAGRAM



REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

(Continued Next Page)

SLR
22118 20th Ave. SE, Suite G-202
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

WELL NUMBER MW-17

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/30/19
GROUND ELEVATION 12.61 ft **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 7.5 ft
LOGGED BY C. Lee **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM

WELL COMPLETION DETAILS:

0.0 to 1.0 feet: Concrete.
1.0 to 2.5 feet: Hydrated bentonite chips.
2.5 to 13.0 feet: 10x20 silica sand pack.

0.0 to 3.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC riser.
3.0 to 12.8 feet: 2"-diameter, flush-threaded Sch. 40 PVC 0.010-slotted well screen.
12.8 to 13.0 feet: 2"-diameter, flush-threaded Sch. 40 PVC cap.

REMARKS

Boring completed at 15.0 feet bgs.
Monitoring well installed adjacent to Geoprobe boring with a hollow stem auger. Lithology descriptions based on Geoprobe borings.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.

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Bothell, Washington 98021
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Fax: 425.402.8488

BORING NUMBER GP-801

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/26/19
GROUND ELEVATION **HOLE SIZE** 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 5.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Direct Push		40		0.3	**ASPHALT PAVEMENT**	
					SP		**SAND**, gray-brown, fine to coarse grained, trace fine gravel, moist, no odor	NT
					SM	2.5	**SILTY SAND**, gray, fine to medium grained, little silty fines, trace fine gravel, moist, no odor	2.4
5		Direct Push	GP-801-SS*	50			∇ @ 5.0 feet bgs: Becomes wet	
						6.5	**WOOD**, dark brown-black, solid and fragmented native wood debris	NT
					SP	7.0	**SAND**, dark gray, fine to medium grained, wet, no odor	0.2
10		Direct Push		100				0.0
								0.0
15						15.0		

REMARKS

Boring completed at 15.0 feet bgs.
Temporary monitoring well installed and sampled.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate liner.
* = Soil sample consisted of composite sample fronm 0-12 feet bgs.
∇ Water level at time of drilling.

22118 20th Ave. SE, Suite G-202
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

BORING NUMBER GP-802

PAGE 1 OF 1

CLIENT JELD-WEN, Inc.
PROJECT NAME Former E.A. Nord Door, Inc.
PROJECT NUMBER 108.00228.00059
PROJECT LOCATION 300 West Marine View Drive, Everett, WA
DATE STARTED 4/26/19 **COMPLETED** 4/26/19
GROUND ELEVATION
HOLE SIZE 4" - diameter
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▼ **AT TIME OF DRILLING** 6.0 ft
LOGGED BY S. Losleben **CHECKED BY** C. Kramer
AFTER DRILLING N/A
NOTES

DEPTH (ft)	INTERVAL	TYPE	NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		Hand Auger	GP-802-SS*	100			**CRUSHED ROCK**, gray, crushed 1-inch minus, trace aspahlt fragments	
						0.3		
					SP		**GRAVELLY SAND**, light orange-brown, medium to coarse grained, some fine gravel, trace silt, moist, no odor	0.2
						3.5		
					SP		**SAND**, light brown, fine grained, trace silt, moist, no odor	0.1
						4.5		
5					SP		**SAND**, gray, fine to medium grained, moist, no odor ▽ @ 6.0 feet bgs: Becomes wet	0.0
		Direct Push		100				0.1
10		Direct Push		80				0.0
						13.0		
					SP		**SAND**, dark gray, fine grained, wet, no odor	0.0
15						15.0		

REMARKS

Boring completed at 15.0 feet bgs.
Temporary monitoring well installed and sampled.
NT = Not tested
PID = Photoionization detector readings in parts per million (ppm).
Geoprobe = Soil samples collected as a continuous core within a 5-foot acetate line

▽ Water level at time of drilling.

APPENDIX B

Laboratory Analytical Reports

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 04, 2019

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L1093831
Samples Received:	04/30/2019
Project Number:	108.00228.00059
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By:

Jared Starkey
Project Manager

TABLE OF CONTENTS

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 09:00	04/30/19 08:45

GP-801-GW L1093831-01 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274531	1	05/01/19 19:14	05/01/19 19:14	ADM	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274142	1	05/01/19 17:02	05/02/19 17:48	TH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1274172	1	05/01/19 16:08	05/02/19 02:07	JF	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 16:35	04/30/19 08:45

GP-802-GW L1093831-03 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274531	1	05/01/19 19:34	05/01/19 19:34	ADM	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274142	1	05/01/19 17:02	05/02/19 18:10	TH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1274172	1	05/01/19 16:08	05/02/19 02:28	JF	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jared Starkey
Project Manager

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	4.68	J	1.05	25.0	1	05/01/2019 19:14	WG1274531
Acrylonitrile	U		0.873	5.00	1	05/01/2019 19:14	WG1274531
Benzene	U		0.0896	0.500	1	05/01/2019 19:14	WG1274531
Bromobenzene	U		0.133	0.500	1	05/01/2019 19:14	WG1274531
Bromodichloromethane	U		0.0800	0.500	1	05/01/2019 19:14	WG1274531
Bromochloromethane	U		0.145	0.500	1	05/01/2019 19:14	WG1274531
Bromoform	U		0.186	0.500	1	05/01/2019 19:14	WG1274531
Bromomethane	U		0.157	2.50	1	05/01/2019 19:14	WG1274531
n-Butylbenzene	U		0.143	0.500	1	05/01/2019 19:14	WG1274531
sec-Butylbenzene	U		0.134	0.500	1	05/01/2019 19:14	WG1274531
tert-Butylbenzene	U		0.183	0.500	1	05/01/2019 19:14	WG1274531
Carbon disulfide	U		0.101	0.500	1	05/01/2019 19:14	WG1274531
Carbon tetrachloride	U		0.159	0.500	1	05/01/2019 19:14	WG1274531
Chlorobenzene	U		0.140	0.500	1	05/01/2019 19:14	WG1274531
Chlorodibromomethane	U		0.128	0.500	1	05/01/2019 19:14	WG1274531
Chloroethane	U		0.141	2.50	1	05/01/2019 19:14	WG1274531
Chloroform	U		0.0860	0.500	1	05/01/2019 19:14	WG1274531
Chloromethane	U		0.153	1.25	1	05/01/2019 19:14	WG1274531
2-Chlorotoluene	U		0.111	0.500	1	05/01/2019 19:14	WG1274531
4-Chlorotoluene	U		0.0972	0.500	1	05/01/2019 19:14	WG1274531
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/01/2019 19:14	WG1274531
1,2-Dibromoethane	U		0.193	0.500	1	05/01/2019 19:14	WG1274531
Dibromomethane	U		0.117	0.500	1	05/01/2019 19:14	WG1274531
1,2-Dichlorobenzene	U		0.101	0.500	1	05/01/2019 19:14	WG1274531
1,3-Dichlorobenzene	U		0.130	0.500	1	05/01/2019 19:14	WG1274531
1,4-Dichlorobenzene	U		0.121	0.500	1	05/01/2019 19:14	WG1274531
Dichlorodifluoromethane	U		0.127	2.50	1	05/01/2019 19:14	WG1274531
1,1-Dichloroethane	U		0.114	0.500	1	05/01/2019 19:14	WG1274531
1,2-Dichloroethane	U		0.108	0.500	1	05/01/2019 19:14	WG1274531
1,1-Dichloroethene	U		0.188	0.500	1	05/01/2019 19:14	WG1274531
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/01/2019 19:14	WG1274531
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/01/2019 19:14	WG1274531
1,2-Dichloropropane	U		0.190	0.500	1	05/01/2019 19:14	WG1274531
1,1-Dichloropropene	U		0.128	0.500	1	05/01/2019 19:14	WG1274531
1,3-Dichloropropane	U		0.147	1.00	1	05/01/2019 19:14	WG1274531
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/01/2019 19:14	WG1274531
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/01/2019 19:14	WG1274531
trans-1,4-Dichloro-2-butene	U		0.257	5.00	1	05/01/2019 19:14	WG1274531
2,2-Dichloropropane	U		0.0929	0.500	1	05/01/2019 19:14	WG1274531
Di-isopropyl ether	U		0.0924	0.500	1	05/01/2019 19:14	WG1274531
Ethylbenzene	U		0.158	0.500	1	05/01/2019 19:14	WG1274531
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/01/2019 19:14	WG1274531
2-Hexanone	U		0.757	5.00	1	05/01/2019 19:14	WG1274531
n-Hexane	U		0.305	5.00	1	05/01/2019 19:14	WG1274531
Iodomethane	U		0.377	10.0	1	05/01/2019 19:14	WG1274531
Isopropylbenzene	U		0.126	0.500	1	05/01/2019 19:14	WG1274531
p-Isopropyltoluene	U		0.138	0.500	1	05/01/2019 19:14	WG1274531
2-Butanone (MEK)	U		1.28	5.00	1	05/01/2019 19:14	WG1274531
Methylene Chloride	U		1.07	2.50	1	05/01/2019 19:14	WG1274531
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/01/2019 19:14	WG1274531
Methyl tert-butyl ether	U		0.102	0.500	1	05/01/2019 19:14	WG1274531
Naphthalene	1.52	J	0.174	2.50	1	05/01/2019 19:14	WG1274531
n-Propylbenzene	U		0.162	0.500	1	05/01/2019 19:14	WG1274531
Styrene	U		0.117	0.500	1	05/01/2019 19:14	WG1274531
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/01/2019 19:14	WG1274531
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/01/2019 19:14	WG1274531

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/01/2019 19:14	WG1274531
Tetrachloroethene	U		0.199	0.500	1	05/01/2019 19:14	WG1274531
Toluene	U		0.412	0.500	1	05/01/2019 19:14	WG1274531
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/01/2019 19:14	WG1274531
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/01/2019 19:14	WG1274531
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/01/2019 19:14	WG1274531
1,1,2-Trichloroethane	U		0.186	0.500	1	05/01/2019 19:14	WG1274531
Trichloroethene	U		0.153	0.500	1	05/01/2019 19:14	WG1274531
Trichlorofluoromethane	U	J4	0.130	2.50	1	05/01/2019 19:14	WG1274531
1,2,3-Trichloropropane	U		0.247	2.50	1	05/01/2019 19:14	WG1274531
1,2,4-Trimethylbenzene	U		0.123	0.500	1	05/01/2019 19:14	WG1274531
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/01/2019 19:14	WG1274531
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/01/2019 19:14	WG1274531
Vinyl acetate	U		0.645	5.00	1	05/01/2019 19:14	WG1274531
Vinyl chloride	U	J4	0.118	0.500	1	05/01/2019 19:14	WG1274531
Xylenes, Total	U		0.316	1.50	1	05/01/2019 19:14	WG1274531
(S) Toluene-d8	*96.9*			*80.0-120*		*05/01/2019 19:14*	WG1274531
(S) 4-Bromofluorobenzene	*105*			*77.0-126*		*05/01/2019 19:14*	WG1274531
(S) 1,2-Dichloroethane-d4	*95.9*			*70.0-130*		*05/01/2019 19:14*	WG1274531

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Diesel Range Organics (DRO)	324		66.7	200	1	05/02/2019 17:48	WG1274142
Residual Range Organics (RRO)	396		83.3	250	1	05/02/2019 17:48	WG1274142
(S) o-Terphenyl	*84.7*			*52.0-156*		*05/02/2019 17:48*	WG1274142

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Acenaphthene	U		0.316	1.00	1	05/02/2019 02:07	WG1274172
Acenaphthylene	U		0.309	1.00	1	05/02/2019 02:07	WG1274172
Anthracene	U		0.291	1.00	1	05/02/2019 02:07	WG1274172
Benzo(a)anthracene	U		0.0975	1.00	1	05/02/2019 02:07	WG1274172
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/02/2019 02:07	WG1274172
Benzo(k)fluoranthene	U		0.355	1.00	1	05/02/2019 02:07	WG1274172
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/02/2019 02:07	WG1274172
Benzo(a)pyrene	U		0.340	1.00	1	05/02/2019 02:07	WG1274172
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/02/2019 02:07	WG1274172
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/02/2019 02:07	WG1274172
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/02/2019 02:07	WG1274172
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/02/2019 02:07	WG1274172
2-Chloronaphthalene	U	J4	0.330	1.00	1	05/02/2019 02:07	WG1274172
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/02/2019 02:07	WG1274172
Chrysene	U		0.332	1.00	1	05/02/2019 02:07	WG1274172
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/02/2019 02:07	WG1274172
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/02/2019 02:07	WG1274172
2,4-Dinitrotoluene	U		1.65	10.0	1	05/02/2019 02:07	WG1274172
2,6-Dinitrotoluene	U		0.279	10.0	1	05/02/2019 02:07	WG1274172
Fluoranthene	U		0.310	1.00	1	05/02/2019 02:07	WG1274172
Fluorene	U		0.323	1.00	1	05/02/2019 02:07	WG1274172
Hexachlorobenzene	U		0.341	1.00	1	05/02/2019 02:07	WG1274172
Hexachloro-1,3-butadiene	U	J3	0.329	10.0	1	05/02/2019 02:07	WG1274172
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/02/2019 02:07	WG1274172
Hexachloroethane	U		0.365	10.0	1	05/02/2019 02:07	WG1274172

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/02/2019 02:07	WG1274172
Isophorone	U		0.272	10.0	1	05/02/2019 02:07	WG1274172
Naphthalene	0.801	J J3	0.372	1.00	1	05/02/2019 02:07	WG1274172
Nitrobenzene	U		0.367	10.0	1	05/02/2019 02:07	WG1274172
n-Nitrosodimethylamine	U		1.26	10.0	1	05/02/2019 02:07	WG1274172
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/02/2019 02:07	WG1274172
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/02/2019 02:07	WG1274172
Phenanthrene	U	J4	0.366	1.00	1	05/02/2019 02:07	WG1274172
Pyridine	U		1.37	10.0	1	05/02/2019 02:07	WG1274172
Benzylbutyl phthalate	U		0.275	3.00	1	05/02/2019 02:07	WG1274172
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/02/2019 02:07	WG1274172
Di-n-butyl phthalate	U		0.266	3.00	1	05/02/2019 02:07	WG1274172
Diethyl phthalate	U		0.282	3.00	1	05/02/2019 02:07	WG1274172
Dimethyl phthalate	U		0.283	3.00	1	05/02/2019 02:07	WG1274172
Di-n-octyl phthalate	U		0.278	3.00	1	05/02/2019 02:07	WG1274172
Pyrene	U		0.330	1.00	1	05/02/2019 02:07	WG1274172
1,2,4-Trichlorobenzene	U	J3	0.355	10.0	1	05/02/2019 02:07	WG1274172
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/02/2019 02:07	WG1274172
2-Chlorophenol	U		0.283	10.0	1	05/02/2019 02:07	WG1274172
2,4-Dichlorophenol	U		0.284	10.0	1	05/02/2019 02:07	WG1274172
2,4-Dimethylphenol	U		0.264	10.0	1	05/02/2019 02:07	WG1274172
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/02/2019 02:07	WG1274172
2,4-Dinitrophenol	U	J3	3.25	10.0	1	05/02/2019 02:07	WG1274172
2-Methylphenol	U		0.312	10.0	1	05/02/2019 02:07	WG1274172
3&4-Methyl Phenol	0.599	J	0.266	10.0	1	05/02/2019 02:07	WG1274172
2-Nitrophenol	U		0.320	10.0	1	05/02/2019 02:07	WG1274172
4-Nitrophenol	U		2.01	10.0	1	05/02/2019 02:07	WG1274172
Pentachlorophenol	U		0.313	10.0	1	05/02/2019 02:07	WG1274172
Phenol	18.5		0.334	10.0	1	05/02/2019 02:07	WG1274172
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/02/2019 02:07	WG1274172
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/02/2019 02:07	WG1274172
(S) 2-Fluorophenol	*39.9*			*10.0-120*		*05/02/2019 02:07*	WG1274172
(S) Phenol-d5	*28.6*			*10.0-120*		*05/02/2019 02:07*	WG1274172
(S) Nitrobenzene-d5	*69.9*			*10.0-127*		*05/02/2019 02:07*	WG1274172
(S) 2-Fluorobiphenyl	*65.7*			*10.0-130*		*05/02/2019 02:07*	WG1274172
(S) 2,4,6-Tribromophenol	*92.3*			*10.0-155*		*05/02/2019 02:07*	WG1274172
(S) p-Terphenyl-d14	*78.1*			*10.0-128*		*05/02/2019 02:07*	WG1274172

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	5.37	J	1.05	25.0	1	05/01/2019 19:34	WG1274531
Acrylonitrile	U		0.873	5.00	1	05/01/2019 19:34	WG1274531
Benzene	U		0.0896	0.500	1	05/01/2019 19:34	WG1274531
Bromobenzene	U		0.133	0.500	1	05/01/2019 19:34	WG1274531
Bromodichloromethane	U		0.0800	0.500	1	05/01/2019 19:34	WG1274531
Bromochloromethane	U		0.145	0.500	1	05/01/2019 19:34	WG1274531
Bromoform	U		0.186	0.500	1	05/01/2019 19:34	WG1274531
Bromomethane	U		0.157	2.50	1	05/01/2019 19:34	WG1274531
n-Butylbenzene	U		0.143	0.500	1	05/01/2019 19:34	WG1274531
sec-Butylbenzene	U		0.134	0.500	1	05/01/2019 19:34	WG1274531
tert-Butylbenzene	U		0.183	0.500	1	05/01/2019 19:34	WG1274531
Carbon disulfide	U		0.101	0.500	1	05/01/2019 19:34	WG1274531
Carbon tetrachloride	U		0.159	0.500	1	05/01/2019 19:34	WG1274531
Chlorobenzene	U		0.140	0.500	1	05/01/2019 19:34	WG1274531
Chlorodibromomethane	U		0.128	0.500	1	05/01/2019 19:34	WG1274531
Chloroethane	U		0.141	2.50	1	05/01/2019 19:34	WG1274531
Chloroform	U		0.0860	0.500	1	05/01/2019 19:34	WG1274531
Chloromethane	U		0.153	1.25	1	05/01/2019 19:34	WG1274531
2-Chlorotoluene	U		0.111	0.500	1	05/01/2019 19:34	WG1274531
4-Chlorotoluene	U		0.0972	0.500	1	05/01/2019 19:34	WG1274531
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/01/2019 19:34	WG1274531
1,2-Dibromoethane	U		0.193	0.500	1	05/01/2019 19:34	WG1274531
Dibromomethane	U		0.117	0.500	1	05/01/2019 19:34	WG1274531
1,2-Dichlorobenzene	U		0.101	0.500	1	05/01/2019 19:34	WG1274531
1,3-Dichlorobenzene	U		0.130	0.500	1	05/01/2019 19:34	WG1274531
1,4-Dichlorobenzene	U		0.121	0.500	1	05/01/2019 19:34	WG1274531
Dichlorodifluoromethane	U		0.127	2.50	1	05/01/2019 19:34	WG1274531
1,1-Dichloroethane	U		0.114	0.500	1	05/01/2019 19:34	WG1274531
1,2-Dichloroethane	U		0.108	0.500	1	05/01/2019 19:34	WG1274531
1,1-Dichloroethene	U		0.188	0.500	1	05/01/2019 19:34	WG1274531
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/01/2019 19:34	WG1274531
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/01/2019 19:34	WG1274531
1,2-Dichloropropane	U		0.190	0.500	1	05/01/2019 19:34	WG1274531
1,1-Dichloropropene	U		0.128	0.500	1	05/01/2019 19:34	WG1274531
1,3-Dichloropropane	U		0.147	1.00	1	05/01/2019 19:34	WG1274531
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/01/2019 19:34	WG1274531
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/01/2019 19:34	WG1274531
trans-1,4-Dichloro-2-butene	U		0.257	5.00	1	05/01/2019 19:34	WG1274531
2,2-Dichloropropane	U		0.0929	0.500	1	05/01/2019 19:34	WG1274531
Di-isopropyl ether	U		0.0924	0.500	1	05/01/2019 19:34	WG1274531
Ethylbenzene	U		0.158	0.500	1	05/01/2019 19:34	WG1274531
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/01/2019 19:34	WG1274531
2-Hexanone	U		0.757	5.00	1	05/01/2019 19:34	WG1274531
n-Hexane	U		0.305	5.00	1	05/01/2019 19:34	WG1274531
Iodomethane	U		0.377	10.0	1	05/01/2019 19:34	WG1274531
Isopropylbenzene	U		0.126	0.500	1	05/01/2019 19:34	WG1274531
p-Isopropyltoluene	U		0.138	0.500	1	05/01/2019 19:34	WG1274531
2-Butanone (MEK)	U		1.28	5.00	1	05/01/2019 19:34	WG1274531
Methylene Chloride	U		1.07	2.50	1	05/01/2019 19:34	WG1274531
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/01/2019 19:34	WG1274531
Methyl tert-butyl ether	U		0.102	0.500	1	05/01/2019 19:34	WG1274531
Naphthalene	U		0.174	2.50	1	05/01/2019 19:34	WG1274531
n-Propylbenzene	U		0.162	0.500	1	05/01/2019 19:34	WG1274531
Styrene	U		0.117	0.500	1	05/01/2019 19:34	WG1274531
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/01/2019 19:34	WG1274531
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/01/2019 19:34	WG1274531

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/01/2019 19:34	WG1274531
Tetrachloroethene	U		0.199	0.500	1	05/01/2019 19:34	WG1274531
Toluene	U		0.412	0.500	1	05/01/2019 19:34	WG1274531
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/01/2019 19:34	WG1274531
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/01/2019 19:34	WG1274531
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/01/2019 19:34	WG1274531
1,1,2-Trichloroethane	U		0.186	0.500	1	05/01/2019 19:34	WG1274531
Trichloroethene	U		0.153	0.500	1	05/01/2019 19:34	WG1274531
Trichlorofluoromethane	U	J4	0.130	2.50	1	05/01/2019 19:34	WG1274531
1,2,3-Trichloropropane	U		0.247	2.50	1	05/01/2019 19:34	WG1274531
1,2,4-Trimethylbenzene	U		0.123	0.500	1	05/01/2019 19:34	WG1274531
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/01/2019 19:34	WG1274531
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/01/2019 19:34	WG1274531
Vinyl acetate	U		0.645	5.00	1	05/01/2019 19:34	WG1274531
Vinyl chloride	U	J4	0.118	0.500	1	05/01/2019 19:34	WG1274531
Xylenes, Total	U		0.316	1.50	1	05/01/2019 19:34	WG1274531
(S) Toluene-d8	*106*			*80.0-120*		*05/01/2019 19:34*	WG1274531
(S) 4-Bromofluorobenzene	*109*			*77.0-126*		*05/01/2019 19:34*	WG1274531
(S) 1,2-Dichloroethane-d4	*95.2*			*70.0-130*		*05/01/2019 19:34*	WG1274531

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Diesel Range Organics (DRO)	U		66.7	200	1	05/02/2019 18:10	WG1274142
Residual Range Organics (RRO)	U		83.3	250	1	05/02/2019 18:10	WG1274142
(S) o-Terphenyl	*84.2*			*52.0-156*		*05/02/2019 18:10*	WG1274142

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Acenaphthene	U		0.316	1.00	1	05/02/2019 02:28	WG1274172
Acenaphthylene	U		0.309	1.00	1	05/02/2019 02:28	WG1274172
Anthracene	U		0.291	1.00	1	05/02/2019 02:28	WG1274172
Benzo(a)anthracene	U		0.0975	1.00	1	05/02/2019 02:28	WG1274172
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/02/2019 02:28	WG1274172
Benzo(k)fluoranthene	U		0.355	1.00	1	05/02/2019 02:28	WG1274172
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/02/2019 02:28	WG1274172
Benzo(a)pyrene	U		0.340	1.00	1	05/02/2019 02:28	WG1274172
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/02/2019 02:28	WG1274172
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/02/2019 02:28	WG1274172
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/02/2019 02:28	WG1274172
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/02/2019 02:28	WG1274172
2-Chloronaphthalene	U	J4	0.330	1.00	1	05/02/2019 02:28	WG1274172
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/02/2019 02:28	WG1274172
Chrysene	U		0.332	1.00	1	05/02/2019 02:28	WG1274172
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/02/2019 02:28	WG1274172
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/02/2019 02:28	WG1274172
2,4-Dinitrotoluene	U		1.65	10.0	1	05/02/2019 02:28	WG1274172
2,6-Dinitrotoluene	U		0.279	10.0	1	05/02/2019 02:28	WG1274172
Fluoranthene	U		0.310	1.00	1	05/02/2019 02:28	WG1274172
Fluorene	U		0.323	1.00	1	05/02/2019 02:28	WG1274172
Hexachlorobenzene	U		0.341	1.00	1	05/02/2019 02:28	WG1274172
Hexachloro-1,3-butadiene	U	J3	0.329	10.0	1	05/02/2019 02:28	WG1274172
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/02/2019 02:28	WG1274172
Hexachloroethane	U		0.365	10.0	1	05/02/2019 02:28	WG1274172

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/02/2019 02:28	WG1274172
Isophorone	U		0.272	10.0	1	05/02/2019 02:28	WG1274172
Naphthalene	U	J3	0.372	1.00	1	05/02/2019 02:28	WG1274172
Nitrobenzene	U		0.367	10.0	1	05/02/2019 02:28	WG1274172
n-Nitrosodimethylamine	U		1.26	10.0	1	05/02/2019 02:28	WG1274172
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/02/2019 02:28	WG1274172
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/02/2019 02:28	WG1274172
Phenanthrene	U	J4	0.366	1.00	1	05/02/2019 02:28	WG1274172
Pyridine	U		1.37	10.0	1	05/02/2019 02:28	WG1274172
Benzylbutyl phthalate	U		0.275	3.00	1	05/02/2019 02:28	WG1274172
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/02/2019 02:28	WG1274172
Di-n-butyl phthalate	U		0.266	3.00	1	05/02/2019 02:28	WG1274172
Diethyl phthalate	U		0.282	3.00	1	05/02/2019 02:28	WG1274172
Dimethyl phthalate	U		0.283	3.00	1	05/02/2019 02:28	WG1274172
Di-n-octyl phthalate	U		0.278	3.00	1	05/02/2019 02:28	WG1274172
Pyrene	U		0.330	1.00	1	05/02/2019 02:28	WG1274172
1,2,4-Trichlorobenzene	U	J3	0.355	10.0	1	05/02/2019 02:28	WG1274172
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/02/2019 02:28	WG1274172
2-Chlorophenol	U		0.283	10.0	1	05/02/2019 02:28	WG1274172
2,4-Dichlorophenol	U		0.284	10.0	1	05/02/2019 02:28	WG1274172
2,4-Dimethylphenol	U		0.264	10.0	1	05/02/2019 02:28	WG1274172
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/02/2019 02:28	WG1274172
2,4-Dinitrophenol	U	J3	3.25	10.0	1	05/02/2019 02:28	WG1274172
2-Methylphenol	U		0.312	10.0	1	05/02/2019 02:28	WG1274172
3&4-Methyl Phenol	U		0.266	10.0	1	05/02/2019 02:28	WG1274172
2-Nitrophenol	U		0.320	10.0	1	05/02/2019 02:28	WG1274172
4-Nitrophenol	U		2.01	10.0	1	05/02/2019 02:28	WG1274172
Pentachlorophenol	U		0.313	10.0	1	05/02/2019 02:28	WG1274172
Phenol	11.6		0.334	10.0	1	05/02/2019 02:28	WG1274172
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/02/2019 02:28	WG1274172
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/02/2019 02:28	WG1274172
(S) 2-Fluorophenol	*48.1*			*10.0-120*		*05/02/2019 02:28*	WG1274172
(S) Phenol-d5	*31.3*			*10.0-120*		*05/02/2019 02:28*	WG1274172
(S) Nitrobenzene-d5	*78.8*			*10.0-127*		*05/02/2019 02:28*	WG1274172
(S) 2-Fluorobiphenyl	*70.5*			*10.0-130*		*05/02/2019 02:28*	WG1274172
(S) 2,4,6-Tribromophenol	*85.2*			*10.0-155*		*05/02/2019 02:28*	WG1274172
(S) p-Terphenyl-d14	*70.8*			*10.0-128*		*05/02/2019 02:28*	WG1274172

Method Blank (MB)

(MB) R3407196-3 05/01/19 14:01

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		1.05	25.0
Acrylonitrile	U		0.873	5.00
Benzene	U		0.0896	0.500
Bromobenzene	U		0.133	0.500
Bromochloromethane	U		0.145	0.500
Bromodichloromethane	U		0.0800	0.500
Bromoform	U		0.186	0.500
Bromomethane	U		0.157	2.50
n-Butylbenzene	U		0.143	0.500
Carbon disulfide	U		0.101	0.500
sec-Butylbenzene	U		0.134	0.500
tert-Butylbenzene	U		0.183	0.500
Carbon tetrachloride	U		0.159	0.500
Chlorobenzene	U		0.140	0.500
Chlorodibromomethane	U		0.128	0.500
Chloroethane	U		0.141	2.50
Chloroform	U		0.0860	0.500
Chloromethane	U		0.153	1.25
2-Chlorotoluene	U		0.111	0.500
4-Chlorotoluene	U		0.0972	0.500
1,2-Dibromo-3-Chloropropane	U		0.325	2.50
1,2-Dibromoethane	U		0.193	0.500
Dibromomethane	U		0.117	0.500
1,2-Dichlorobenzene	U		0.101	0.500
1,3-Dichlorobenzene	U		0.130	0.500
1,4-Dichlorobenzene	U		0.121	0.500
Dichlorodifluoromethane	U		0.127	2.50
1,1-Dichloroethane	U		0.114	0.500
1,2-Dichloroethane	U		0.108	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.0933	0.500
trans-1,2-Dichloroethene	U		0.152	0.500
1,2-Dichloropropane	U		0.190	0.500
trans-1,4-Dichloro-2-butene	U		0.257	5.00
1,1-Dichloropropene	U		0.128	0.500
1,3-Dichloropropane	U		0.147	1.00
cis-1,3-Dichloropropene	U		0.0976	0.500
trans-1,3-Dichloropropene	U		0.222	0.500
2,2-Dichloropropane	U		0.0929	0.500
2-Hexanone	U		0.757	5.00

Method Blank (MB)

(MB) R3407196-3 05/01/19 14:01

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
n-Hexane	U		0.305	5.00
Di-isopropyl ether	U		0.0924	0.500
Iodomethane	U		0.377	10.0
Ethylbenzene	U		0.158	0.500
Hexachloro-1,3-butadiene	0.364	J	0.157	1.00
Isopropylbenzene	U		0.126	0.500
p-Isopropyltoluene	U		0.138	0.500
2-Butanone (MEK)	U		1.28	5.00
Methylene Chloride	U		1.07	2.50
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00
Methyl tert-butyl ether	U		0.102	0.500
n-Propylbenzene	U		0.162	0.500
Styrene	U		0.117	0.500
1,1,1,2-Tetrachloroethane	U		0.120	0.500
Naphthalene	U		0.174	2.50
1,1,2,2-Tetrachloroethane	U		0.130	0.500
Tetrachloroethene	U		0.199	0.500
Vinyl acetate	U		0.645	5.00
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.355	0.500
1,1,1-Trichloroethane	U		0.0940	0.500
1,1,2-Trichloroethane	U		0.186	0.500
Toluene	U		0.412	0.500
Trichloroethene	U		0.153	0.500
Trichlorofluoromethane	U		0.130	2.50
1,2,3-Trichloropropane	U		0.247	2.50
1,2,3-Trimethylbenzene	U		0.0739	0.500
1,2,4-Trimethylbenzene	U		0.123	0.500
1,3,5-Trimethylbenzene	U		0.124	0.500
Vinyl chloride	U		0.118	0.500
Xylenes, Total	U		0.316	1.50
(S) Toluene-d8	*95.3*			*80.0-120*
(S) 4-Bromofluorobenzene	*104*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*94.9*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407196-1 05/01/19 13:00 • (LCSD) R3407196-2 05/01/19 13:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromochloromethane	25.0	24.8	23.3	99.1	93.2	76.0-122			6.07	20
Carbon disulfide	25.0	31.6	29.0	126	116	61.0-128			8.78	20
Acetone	125	171	172	137	138	19.0-160			0.538	27
Acrylonitrile	125	152	164	122	131	55.0-149			7.52	20
Bromobenzene	25.0	22.4	22.8	89.6	91.0	73.0-121			1.56	20
Bromodichloromethane	25.0	22.6	20.4	90.6	81.8	75.0-120			10.2	20
Bromoform	25.0	27.2	26.7	109	107	68.0-132			1.80	20
Bromomethane	25.0	16.8	15.6	67.2	62.4	10.0-160			7.45	25
trans-1,4-Dichloro-2-butene	25.0	19.8	19.9	79.3	79.7	33.0-144			0.492	20
n-Butylbenzene	25.0	20.9	21.6	83.7	86.5	73.0-125			3.29	20
sec-Butylbenzene	25.0	22.2	22.1	88.6	88.2	75.0-125			0.452	20
tert-Butylbenzene	25.0	22.7	23.1	90.8	92.4	76.0-124			1.77	20
2-Hexanone	125	136	141	109	112	67.0-149			2.94	20
Carbon tetrachloride	25.0	24.2	24.2	96.8	96.9	68.0-126			0.0831	20
Chlorobenzene	25.0	24.3	23.9	97.3	95.8	80.0-121			1.61	20
n-Hexane	25.0	30.0	31.2	120	125	57.0-133			3.89	20
Chlorodibromomethane	25.0	24.4	23.8	97.6	95.2	77.0-125			2.53	20
Iodomethane	125	145	132	116	106	33.0-147			8.95	26
Chloroethane	25.0	16.1	14.3	64.4	57.1	47.0-150			12.0	20
Chloroform	25.0	22.3	22.2	89.2	88.7	73.0-120			0.549	20
Chloromethane	25.0	21.8	20.0	87.2	79.9	41.0-142			8.74	20
2-Chlorotoluene	25.0	21.7	21.8	87.0	87.2	76.0-123			0.258	20
Benzene	25.0	26.1	26.3	104	105	70.0-123			1.07	20
4-Chlorotoluene	25.0	22.3	22.3	89.2	89.3	75.0-122			0.138	20
1,2-Dibromo-3-Chloropropane	25.0	25.8	26.4	103	106	58.0-134			2.11	20
1,2-Dibromoethane	25.0	23.7	23.3	94.9	93.4	80.0-122			1.64	20
Dibromomethane	25.0	23.3	21.0	93.1	83.8	80.0-120			10.5	20
1,2-Dichlorobenzene	25.0	22.9	23.2	91.8	92.7	79.0-121			1.02	20
1,3-Dichlorobenzene	25.0	22.6	22.8	90.4	91.0	79.0-120			0.627	20
1,4-Dichlorobenzene	25.0	22.2	22.1	88.8	88.3	79.0-120			0.623	20
Dichlorodifluoromethane	25.0	25.1	22.8	100	91.2	51.0-149			9.69	20
1,1-Dichloroethane	25.0	24.3	25.4	97.4	102	70.0-126			4.35	20
1,2-Dichloroethane	25.0	21.2	21.8	84.9	87.2	70.0-128			2.68	20
1,1-Dichloroethene	25.0	27.6	25.2	110	101	71.0-124			9.13	20
cis-1,2-Dichloroethene	25.0	24.3	23.8	97.2	95.2	73.0-120			2.05	20
trans-1,2-Dichloroethene	25.0	25.1	24.9	100	99.5	73.0-120			0.882	20
1,2-Dichloropropane	25.0	26.3	23.7	105	94.6	77.0-125			10.8	20
1,1-Dichloropropene	25.0	24.7	25.1	98.7	100	74.0-126			1.53	20
1,3-Dichloropropane	25.0	24.5	24.1	98.1	96.2	80.0-120			1.92	20
cis-1,3-Dichloropropene	25.0	24.2	22.1	96.8	88.6	80.0-123			8.90	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407196-1 05/01/19 13:00 • (LCSD) R3407196-2 05/01/19 13:20

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Vinyl acetate	125	122	136	97.4	109	11.0-160			11.3	20
trans-1,3-Dichloropropene	25.0	23.1	22.6	92.4	90.3	78.0-124			2.24	20
2,2-Dichloropropane	25.0	30.4	30.6	121	122	58.0-130			0.649	20
Di-isopropyl ether	25.0	27.1	30.0	108	120	58.0-138			10.4	20
Hexachloro-1,3-butadiene	25.0	26.9	27.7	108	111	54.0-138			2.73	20
Isopropylbenzene	25.0	26.2	25.6	105	102	76.0-127			2.41	20
p-Isopropyltoluene	25.0	22.9	22.6	91.6	90.5	76.0-125			1.18	20
2-Butanone (MEK)	125	151	168	120	134	44.0-160			11.0	20
Methylene Chloride	25.0	25.0	25.0	100	100	67.0-120			0.215	20
4-Methyl-2-pentanone (MIBK)	125	133	130	106	104	68.0-142			2.31	20
Ethylbenzene	25.0	24.8	24.2	99.1	96.8	79.0-123			2.30	20
n-Propylbenzene	25.0	21.6	22.0	86.3	88.0	77.0-124			2.01	20
Styrene	25.0	27.7	27.1	111	108	73.0-130			2.40	20
1,1,1,2-Tetrachloroethane	25.0	24.0	23.7	95.9	94.8	75.0-125			1.07	20
1,1,2,2-Tetrachloroethane	25.0	21.3	21.7	85.1	86.7	65.0-130			1.87	20
Tetrachloroethene	25.0	26.6	25.8	106	103	72.0-132			3.02	20
1,1,2-Trichlorotrifluoroethane	25.0	26.2	24.1	105	96.6	69.0-132			8.24	20
1,2,3-Trichlorobenzene	25.0	23.7	24.3	94.7	97.4	50.0-138			2.83	20
1,2,4-Trichlorobenzene	25.0	24.9	25.4	99.5	102	57.0-137			2.03	20
1,1,1-Trichloroethane	25.0	24.0	23.5	96.1	94.0	73.0-124			2.22	20
1,1,2-Trichloroethane	25.0	22.9	22.5	91.6	90.1	80.0-120			1.71	20
Trichloroethene	25.0	26.1	24.2	105	96.9	78.0-124			7.61	20
Trichlorofluoromethane	25.0	16.0	14.6	64.2	58.3	59.0-147		J4	9.60	20
1,2,3-Trichloropropane	25.0	19.6	20.0	78.4	80.0	73.0-130			1.90	20
Methyl tert-butyl ether	25.0	24.3	24.8	97.4	99.1	68.0-125			1.76	20
1,2,3-Trimethylbenzene	25.0	21.3	21.0	85.0	83.9	77.0-120			1.30	20
1,2,4-Trimethylbenzene	25.0	21.6	21.6	86.5	86.6	76.0-121			0.129	20
1,3,5-Trimethylbenzene	25.0	21.8	22.1	87.3	88.2	76.0-122			1.10	20
Naphthalene	25.0	23.6	24.3	94.3	97.2	54.0-135			3.09	20
Vinyl chloride	25.0	17.1	15.2	68.3	60.9	67.0-131		J4	11.4	20
Toluene	25.0	26.1	25.4	104	102	79.0-120			2.46	20
Xylenes, Total	75.0	74.9	73.8	99.9	98.4	79.0-123			1.48	20
(S) Toluene-d8				*101*	*100*	*80.0-120*				
(S) 4-Bromofluorobenzene				*109*	*111*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*89.8*	*102*	*70.0-130*				

WG1274142

QUALITY CONTROL SUMMARY

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

L1093831-01,03

Method Blank (MB)

(MB) R3407446-1 05/02/19 00:20

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*79.0*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407446-2 05/02/19 01:03 • (LCSD) R3407446-3 05/02/19 01:46

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	750	883	841	118	112	50.0-150			4.87	20
Residual Range Organics (RRO)	750	665	620	88.7	82.7	50.0-150			7.00	20
(S) o-Terphenyl				*92.0*	*89.0*	*52.0-156*				

Method Blank (MB)

(MB) R3407356-3 05/01/19 23:25

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.316	1.00
Acenaphthylene	U		0.309	1.00
Anthracene	U		0.291	1.00
Benzo(a)anthracene	U		0.0975	1.00
Benzo(b)fluoranthene	U		0.0896	1.00
Benzo(k)fluoranthene	U		0.355	1.00
Benzo(g,h,i)perylene	U		0.161	1.00
Benzo(a)pyrene	U		0.340	1.00
Bis(2-chlorethoxy)methane	U		0.329	10.0
Bis(2-chloroethyl)ether	U		1.62	10.0
Bis(2-chloroisopropyl)ether	U		0.445	10.0
4-Bromophenyl-phenylether	U		0.335	10.0
2-Chloronaphthalene	U		0.330	1.00
4-Chlorophenyl-phenylether	U		0.303	10.0
Chrysene	U		0.332	1.00
Dibenz(a,h)anthracene	U		0.279	1.00
3,3-Dichlorobenzidine	U		2.02	10.0
2,4-Dinitrotoluene	U		1.65	10.0
2,6-Dinitrotoluene	U		0.279	10.0
Fluoranthene	U		0.310	1.00
Fluorene	U		0.323	1.00
Hexachlorobenzene	U		0.341	1.00
Hexachloro-1,3-butadiene	U		0.329	10.0
Hexachlorocyclopentadiene	U		2.33	10.0
Hexachloroethane	U		0.365	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.272	10.0
Naphthalene	U		0.372	1.00
Nitrobenzene	U		0.367	10.0
n-Nitrosodimethylamine	U		1.26	10.0
n-Nitrosodiphenylamine	U		1.19	10.0
n-Nitrosodi-n-propylamine	U		0.403	10.0
Phenanthrene	U		0.366	1.00
Benzylbutyl phthalate	U		0.275	3.00
Bis(2-ethylhexyl)phthalate	U		0.709	3.00
Di-n-butyl phthalate	U		0.266	3.00
Diethyl phthalate	U		0.282	3.00
Dimethyl phthalate	U		0.283	3.00
Di-n-octyl phthalate	U		0.278	3.00
Pyrene	U		0.330	1.00

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3407356-3 05/01/19 23:25

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyridine	U		1.37	10.0
1,2,4-Trichlorobenzene	U		0.355	10.0
4-Chloro-3-methylphenol	U		0.263	10.0
2-Chlorophenol	U		0.283	10.0
2-Methylphenol	U		0.312	10.0
3&4-Methyl Phenol	U		0.266	10.0
2,4-Dichlorophenol	U		0.284	10.0
2,4-Dimethylphenol	U		0.264	10.0
4,6-Dinitro-2-methylphenol	U		2.62	10.0
2,4-Dinitrophenol	U		3.25	10.0
2-Nitrophenol	U		0.320	10.0
4-Nitrophenol	U		2.01	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		0.334	10.0
2,4,5-Trichlorophenol	U		0.236	10.0
2,4,6-Trichlorophenol	U		0.297	10.0
(S) Nitrobenzene-d5	*64.6*			*10.0-127*
(S) 2-Fluorobiphenyl	*64.2*			*10.0-130*
(S) p-Terphenyl-d14	*75.0*			*10.0-128*
(S) Phenol-d5	*25.8*			*10.0-120*
(S) 2-Fluorophenol	*40.3*			*10.0-120*
(S) 2,4,6-Tribromophenol	*74.0*			*10.0-155*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407356-1 05/01/19 22:44 • (LCSD) R3407356-2 05/01/19 23:04

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	23.3	20.8	46.6	41.6	41.0-120			11.3	22
Acenaphthylene	50.0	28.2	24.0	56.4	48.0	43.0-120			16.1	22
Anthracene	50.0	23.8	23.1	47.6	46.2	45.0-120			2.99	20
Benzo(a)anthracene	50.0	28.3	27.9	56.6	55.8	47.0-120			1.42	20
Benzo(b)fluoranthene	50.0	27.4	27.5	54.8	55.0	46.0-120			0.364	20
Benzo(k)fluoranthene	50.0	28.1	28.4	56.2	56.8	46.0-120			1.06	21
Benzo(g,h,i)perylene	50.0	26.1	26.0	52.2	52.0	48.0-121			0.384	20
Benzo(a)pyrene	50.0	27.2	27.0	54.4	54.0	47.0-120			0.738	20
Bis(2-chlorethoxy)methane	50.0	25.3	23.8	50.6	47.6	33.0-120			6.11	24
Bis(2-chloroethyl)ether	50.0	25.0	21.1	50.0	42.2	23.0-120			16.9	33
Bis(2-chloroisopropyl)ether	50.0	22.4	17.4	44.8	34.8	28.0-120			25.1	31

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407356-1 05/01/19 22:44 • (LCSD) R3407356-2 05/01/19 23:04

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Bromophenyl-phenylether	50.0	26.6	24.6	53.2	49.2	45.0-120			7.81	20
2-Chloronaphthalene	50.0	20.9	17.6	41.8	35.2	37.0-120		J4	17.1	25
4-Chlorophenyl-phenylether	50.0	28.9	26.6	57.8	53.2	44.0-120			8.29	20
Chrysene	50.0	26.2	26.7	52.4	53.4	48.0-120			1.89	20
Dibenz(a,h)anthracene	50.0	27.3	27.3	54.6	54.6	47.0-120			0.000	20
3,3-Dichlorobenzidine	100	55.8	53.7	55.8	53.7	44.0-120			3.84	20
2,4-Dinitrotoluene	50.0	32.4	34.3	64.8	68.6	49.0-124			5.70	20
2,6-Dinitrotoluene	50.0	29.1	30.5	58.2	61.0	46.0-120			4.70	21
Fluoranthene	50.0	30.2	30.6	60.4	61.2	51.0-120			1.32	20
Fluorene	50.0	28.6	26.7	57.2	53.4	47.0-120			6.87	20
Hexachlorobenzene	50.0	28.1	25.3	56.2	50.6	44.0-120			10.5	20
Hexachloro-1,3-butadiene	50.0	22.8	16.2	45.6	32.4	19.0-120		J3	33.8	32
Hexachlorocyclopentadiene	50.0	18.7	14.0	37.4	28.0	15.0-120			28.7	31
Indeno(1,2,3-cd)pyrene	50.0	27.2	27.0	54.4	54.0	49.0-122			0.738	20
Isophorone	50.0	28.3	26.0	56.6	52.0	36.0-120			8.47	23
Naphthalene	50.0	21.3	16.1	42.6	32.2	27.0-120		J3	27.8	27
Nitrobenzene	50.0	23.6	20.2	47.2	40.4	27.0-120			15.5	29
n-Nitrosodimethylamine	50.0	17.3	16.8	34.6	33.6	10.0-120			2.93	40
n-Nitrosodiphenylamine	50.0	25.0	23.7	50.0	47.4	47.0-120			5.34	20
n-Nitrosodi-n-propylamine	50.0	28.4	25.7	56.8	51.4	31.0-120			9.98	28
Phenanthrene	50.0	23.7	22.3	47.4	44.6	46.0-120		J4	6.09	20
Benzylbutyl phthalate	50.0	26.9	26.5	53.8	53.0	43.0-121			1.50	20
Bis(2-ethylhexyl)phthalate	50.0	27.9	27.7	55.8	55.4	43.0-122			0.719	20
Di-n-butyl phthalate	50.0	32.4	32.7	64.8	65.4	49.0-121			0.922	20
Diethyl phthalate	50.0	34.6	36.0	69.2	72.0	48.0-122			3.97	20
Dimethyl phthalate	50.0	29.6	32.1	59.2	64.2	48.0-120			8.10	20
Di-n-octyl phthalate	50.0	29.7	29.2	59.4	58.4	42.0-125			1.70	20
Pyrene	50.0	24.2	23.9	48.4	47.8	47.0-120			1.25	20
Pyridine	50.0	17.0	16.4	34.0	32.8	10.0-120			3.59	38
1,2,4-Trichlorobenzene	50.0	19.1	13.8	38.2	27.6	24.0-120		J3	32.2	29
4-Chloro-3-methylphenol	50.0	31.3	30.3	62.6	60.6	40.0-120			3.25	21
2-Chlorophenol	50.0	23.1	20.1	46.2	40.2	25.0-120			13.9	35
2-Methylphenol	50.0	24.5	21.7	49.0	43.4	28.0-120			12.1	29
3&4-Methyl Phenol	50.0	26.6	23.6	53.2	47.2	31.0-120			12.0	30
2,4-Dichlorophenol	50.0	25.6	22.0	51.2	44.0	36.0-120			15.1	26
2,4-Dimethylphenol	50.0	27.2	24.9	54.4	49.8	33.0-120			8.83	26
4,6-Dinitro-2-methylphenol	50.0	30.0	27.6	60.0	55.2	38.0-138			8.33	25
2,4-Dinitrophenol	50.0	30.7	13.4	61.4	26.8	10.0-120		J3	78.5	39
2-Nitrophenol	50.0	24.3	21.1	48.6	42.2	31.0-120			14.1	29
4-Nitrophenol	50.0	15.8	14.7	31.6	29.4	10.0-120			7.21	33

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407356-1 05/01/19 22:44 • (LCSD) R3407356-2 05/01/19 23:04

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Pentachlorophenol	50.0	27.0	25.1	54.0	50.2	23.0-120			7.29	25
Phenol	50.0	12.5	11.3	25.0	22.6	10.0-120			10.1	36
2,4,5-Trichlorophenol	50.0	29.1	28.9	58.2	57.8	44.0-120			0.690	22
2,4,6-Trichlorophenol	50.0	28.6	26.7	57.2	53.4	42.0-120			6.87	23
(S) Nitrobenzene-d5				*49.9*	*39.5*	*10.0-127*				
(S) 2-Fluorobiphenyl				*50.1*	*40.9*	*10.0-130*				
(S) p-Terphenyl-d14				*54.1*	*54.2*	*10.0-128*				
(S) Phenol-d5				*22.8*	*20.5*	*10.0-120*				
(S) 2-Fluorophenol				*34.0*	*29.6*	*10.0-120*				
(S) 2,4,6-Tribromophenol				*63.5*	*61.0*	*10.0-155*				

L1093799-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1093799-01 05/02/19 03:08 • (MS) R3407356-4 05/02/19 03:29 • (MSD) R3407356-5 05/02/19 03:49

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	U	32.8	34.5	65.6	69.0	1	28.0-120			5.05	25
Acenaphthylene	50.0	U	38.7	40.9	77.4	81.8	1	31.0-121			5.53	25
Anthracene	50.0	U	35.4	37.6	70.8	75.2	1	36.0-120			6.03	23
Benzo(a)anthracene	50.0	U	40.6	42.7	81.2	85.4	1	39.0-120			5.04	23
Benzo(b)fluoranthene	50.0	U	42.6	43.3	85.2	86.6	1	37.0-120			1.63	23
Benzo(k)fluoranthene	50.0	U	40.1	40.6	80.2	81.2	1	37.0-120			1.24	26
Benzo(g,h,i)perylene	50.0	U	35.7	38.8	71.4	77.6	1	37.0-123			8.32	25
Benzo(a)pyrene	50.0	U	39.9	40.7	79.8	81.4	1	37.0-120			1.99	24
Bis(2-chlorethoxy)methane	50.0	U	33.9	34.8	67.8	69.6	1	17.0-120			2.62	31
Bis(2-chloroethyl)ether	50.0	U	58.5	78.9	117	158	1	14.0-120		J5	29.7	33
Bis(2-chloroisopropyl)ether	50.0	U	35.6	72.4	71.2	145	1	18.0-120		J3 J5	68.1	34
4-Bromophenyl-phenylether	50.0	U	40.6	44.3	81.2	88.6	1	37.0-120			8.72	24
2-Chloronaphthalene	50.0	U	29.8	33.9	59.6	67.8	1	29.0-120			12.9	28
4-Chlorophenyl-phenylether	50.0	U	41.6	42.0	83.2	84.0	1	36.0-120			0.957	23
Chrysene	50.0	U	37.2	38.3	74.4	76.6	1	38.0-120			2.91	23
Dibenz(a,h)anthracene	50.0	U	37.0	38.8	74.0	77.6	1	36.0-121			4.75	24
3,3-Dichlorobenzidine	100	U	ND	ND	0.000	0.000	1	10.0-134	J6	J6	0.000	30
2,4-Dinitrotoluene	50.0	U	44.1	44.0	88.2	88.0	1	39.0-125			0.227	25
2,6-Dinitrotoluene	50.0	U	43.1	40.8	86.2	81.6	1	36.0-120			5.48	27
Fluoranthene	50.0	U	43.3	45.1	86.6	90.2	1	41.0-121			4.07	22
Fluorene	50.0	U	41.2	41.9	82.4	83.8	1	37.0-120			1.68	24
Hexachlorobenzene	50.0	U	39.6	43.9	79.2	87.8	1	35.0-122			10.3	24
Hexachloro-1,3-butadiene	50.0	U	26.3	39.0	52.6	78.0	1	12.0-120		J3	38.9	34

L1093799-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1093799-01 05/02/19 03:08 • (MS) R3407356-4 05/02/19 03:29 • (MSD) R3407356-5 05/02/19 03:49

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Hexachlorocyclopentadiene	50.0	U	18.9	16.1	37.8	32.2	1	10.0-120			16.0	33
Indeno(1,2,3-cd)pyrene	50.0	U	37.6	39.4	75.2	78.8	1	38.0-125			4.68	24
Isophorone	50.0	U	34.7	42.9	69.4	85.8	1	21.0-120			21.1	27
Naphthalene	50.0	2.29	25.9	36.1	47.2	67.6	1	10.0-120		J3	32.9	31
Nitrobenzene	50.0	U	27.7	39.7	55.4	79.4	1	12.0-120		J3	35.6	30
n-Nitrosodimethylamine	50.0	U	33.0	46.7	66.0	93.4	1	10.0-120			34.4	40
n-Nitrosodiphenylamine	50.0	U	38.8	42.4	77.6	84.8	1	37.0-120			8.87	24
n-Nitrosodi-n-propylamine	50.0	U	50.5	71.3	101	143	1	16.0-120		J3 J5	34.2	30
Phenanthrene	50.0	U	35.3	37.0	70.6	74.0	1	33.0-120			4.70	22
Benzylbutyl phthalate	50.0	U	42.0	43.5	84.0	87.0	1	34.0-126			3.51	24
Bis(2-ethylhexyl)phthalate	50.0	3.08	47.8	55.1	89.4	104	1	33.0-126			14.2	25
Di-n-butyl phthalate	50.0	U	47.8	49.2	95.6	98.4	1	35.0-128			2.89	23
Diethyl phthalate	50.0	U	49.6	47.5	99.2	95.0	1	39.0-125			4.33	24
Dimethyl phthalate	50.0	U	40.4	42.3	80.8	84.6	1	37.0-120			4.59	24
Di-n-octyl phthalate	50.0	U	43.1	44.8	86.2	89.6	1	25.0-135			3.87	26
Pyrene	50.0	U	39.3	39.5	78.6	79.0	1	39.0-120			0.508	22
Pyridine	50.0	4.35	26.5	36.8	44.3	64.9	1	10.0-120			32.5	37
1,2,4-Trichlorobenzene	50.0	U	19.1	28.0	38.2	56.0	1	15.0-120		J3	37.8	31
4-Chloro-3-methylphenol	50.0	U	62.1	73.2	124	146	1	26.0-120	J5	J5	16.4	27
2-Chlorophenol	50.0	U	10.9	15.3	21.8	30.6	1	18.0-120			33.6	34
2-Methylphenol	50.0	U	51.5	61.7	103	123	1	10.0-120		J5	18.0	30
3&4-Methyl Phenol	50.0	215	240	298	50.0	166	1	10.0-120		E V	21.6	36
2,4-Dichlorophenol	50.0	U	33.8	43.8	67.6	87.6	1	19.0-120			25.8	27
2,4-Dimethylphenol	50.0	U	42.1	51.0	84.2	102	1	15.0-120			19.1	28
4,6-Dinitro-2-methylphenol	50.0	U	35.9	36.4	71.8	72.8	1	10.0-144			1.38	39
2,4-Dinitrophenol	50.0	U	36.6	33.6	73.2	67.2	1	10.0-120			8.55	40
2-Nitrophenol	50.0	U	23.5	32.6	47.0	65.2	1	20.0-120		J3	32.4	30
4-Nitrophenol	50.0	U	75.2	82.2	150	164	1	10.0-120	J5	J5	8.89	40
Pentachlorophenol	50.0	U	45.5	46.0	91.0	92.0	1	10.0-128			1.09	37
Phenol	50.0	60.9	70.8	94.7	19.8	67.6	1	10.0-120			28.9	40
2,4,5-Trichlorophenol	50.0	U	42.6	44.6	85.2	89.2	1	33.0-120			4.59	31
2,4,6-Trichlorophenol	50.0	U	35.6	39.9	71.2	79.8	1	26.0-120			11.4	31
(S) Nitrobenzene-d5					*54.0*	*74.8*		*10.0-127*				
(S) 2-Fluorobiphenyl					*67.6*	*94.2*		*10.0-130*				
(S) p-Terphenyl-d14					*92.0*	*98.8*		*10.0-128*				
(S) Phenol-d5					*58.5*	*8.80*		*10.0-120*		J2		
(S) 2-Fluorophenol					*44.8*	*55.0*		*10.0-120*				
(S) 2,4,6-Tribromophenol					*94.5*	*105*		*10.0-155*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

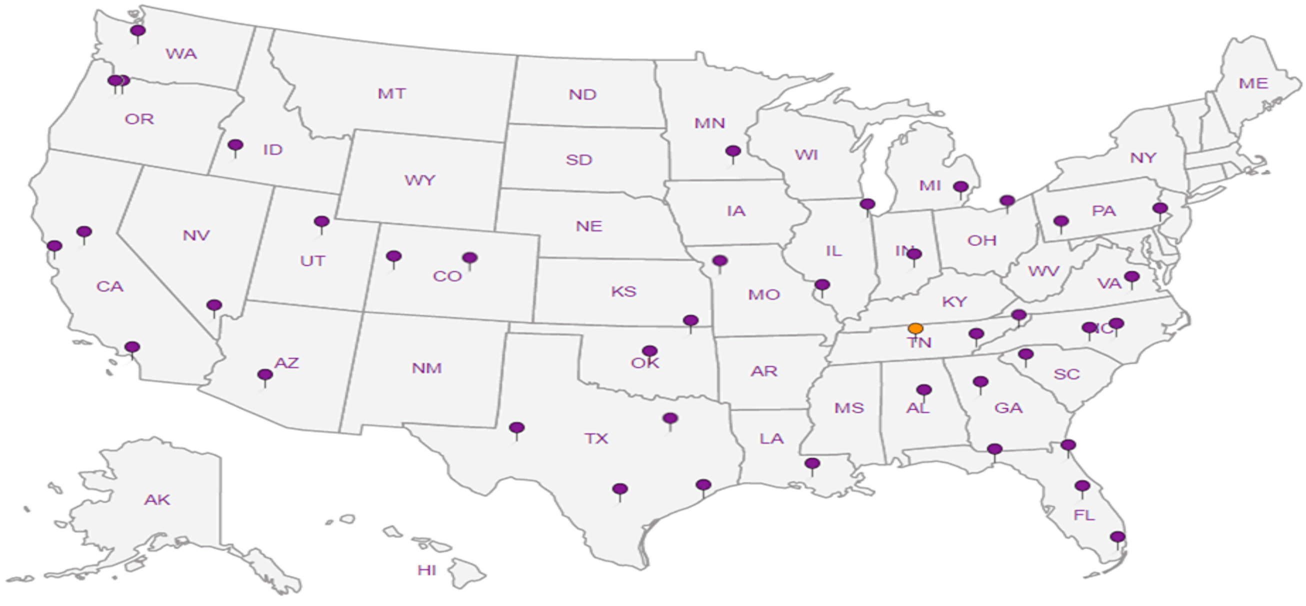
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:
Accounts Payable
1800 Blankenship Rd, Ste 440
West Linn, OR 97068

Pres Chk

Chain of Custody Page 1 of 1

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.000~~48~~** 59

Lab Project # **SLRWLOR-NORDDOOR**

Collected by (print): Steven Losleben

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y X

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed: Standard TAT

L# L1093801

Tab B036

Acctnum: **SLRWLOR**
Template: **T148768**
Prelogin: **P703211**
TSR: **110 - Brian Ford**
PB:
Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No of Cntrs	Benzene Naph 8260LLC 40mlAmb-HCl	NWTPHDX LVINOSGT 40mlAmb-HCl-BT	SVOCs 8270D 100ml Amb NoPres	Total PP Metals 6020 250mlHDPE-HNO3	VOCs V8260LLC 40mlAmb-HCl	cPAHs (PAHSIMLVID) 40mlAmb-NoPres-WT					Remarks	Sample # (lab only)
GP-801-GW	–	GW	–	4/26/19	0900	9		X	X		X	X						-01
GP-801-GW	–	GW	–	4/26/19	1635	9		X	X		X	X						
		GW																
		GW																
		GW																
		GW																
		GW																
		GW																
		GW																
		GW																

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS [✓ FedEx] __ Courier ______

Tracking # 4686 6470 0200

Sample Receipt Checklist ✓
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N

Relinquished by : (Signature)	Date: 4/29/19	Time:	Received by: (Signature) 1400	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0-6±0=0-6 PN AL °C Bottles Received: 18
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4/30/19 Time: 0845

If preservation required by Login: Date/Time

Hold:

Condition: [✓ NCF] / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 08, 2019

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L1093844
Samples Received:	04/30/2019
Project Number:	108.00228.00059
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager

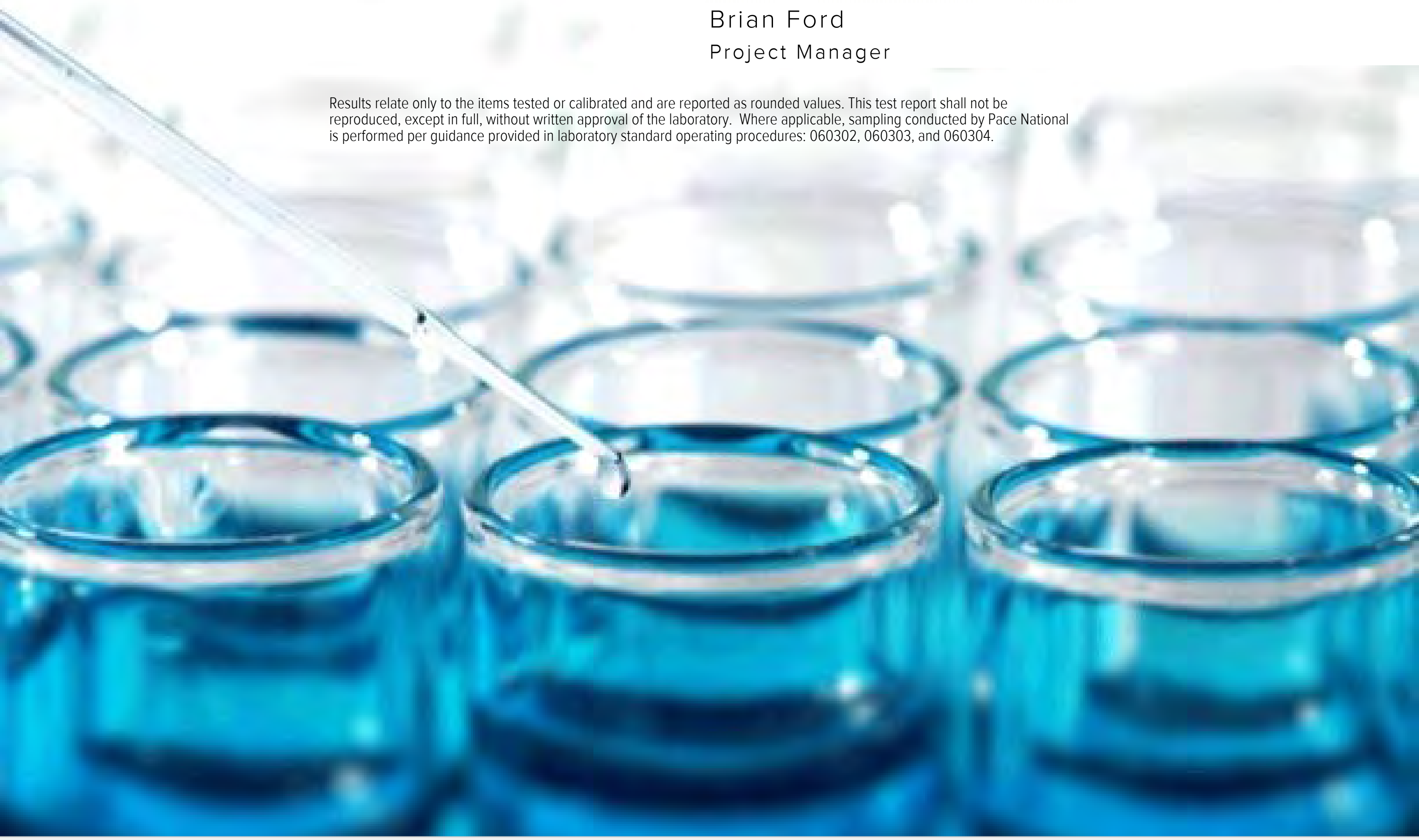


TABLE OF CONTENTS

SAMPLE SUMMARY

GP-MW-11-SS L1093844-01 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/25/19 15:10	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/25/19 15:10	05/01/19 12:58	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1275175	1	04/25/19 15:10	05/02/19 14:11	JHH	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	5	05/03/19 07:41	05/04/19 17:45	SNR	Mt. Juliet, TN

GP-MW-12-SS L1093844-02 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/25/19 11:40	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/25/19 11:40	05/01/19 13:17	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1275238	1	05/02/19 16:00	05/03/19 14:55	DMG	Mt. Juliet, TN

GP-MW-13-SS L1093844-04 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/25/19 09:40	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	5	05/03/19 07:41	05/04/19 17:07	SNR	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1275238	1	05/02/19 16:00	05/03/19 15:16	DMG	Mt. Juliet, TN

GP-MW-14-SS L1093844-05 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/25/19 14:15	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	5	05/03/19 07:41	05/04/19 17:26	SNR	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1276612	1	05/06/19 12:55	05/07/19 12:19	DMG	Mt. Juliet, TN

GP-MW-15-SS L1093844-06 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 13:42	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/26/19 13:42	05/01/19 13:37	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1275175	1	04/26/19 13:42	05/02/19 14:30	JHH	Mt. Juliet, TN

GP-MW-16-SS L1093844-07 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 13:15	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274928	10	05/02/19 08:58	05/02/19 22:43	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	10	05/03/19 07:41	05/06/19 17:36	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1276612	1	05/06/19 12:55	05/07/19 13:44	DMG	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

GP-MW-17-SS L1093844-08 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 14:50	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/26/19 14:50	05/01/19 13:57	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274928	1	05/02/19 08:58	05/02/19 21:25	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	1	05/03/19 07:41	05/04/19 16:47	SNR	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	5	05/03/19 07:41	05/06/19 19:32	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1276612	1	05/06/19 12:55	05/07/19 12:41	DMG	Mt. Juliet, TN

GP-801-SS L1093844-09 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 08:45	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275562	1	05/03/19 14:20	05/03/19 14:31	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/26/19 08:45	05/01/19 14:16	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274928	10	05/02/19 08:58	05/02/19 23:09	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	10	05/03/19 07:41	05/06/19 18:15	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1276612	1	05/06/19 12:55	05/07/19 13:02	DMG	Mt. Juliet, TN

GP-802-SS L1093844-10 Solid

Collected by	Collected date/time	Received date/time
S.L.	04/26/19 16:15	04/30/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1275563	1	05/03/19 14:01	05/03/19 14:10	KDW	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1274486	1	04/26/19 16:15	05/01/19 14:36	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1274928	1	05/02/19 08:58	05/02/19 22:04	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1275198	10	05/03/19 07:41	05/06/19 17:56	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1276612	1	05/06/19 12:55	05/07/19 13:23	DMG	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Project Manager

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	82.5		1	05/03/2019 14:31	WG1275562

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0166	0.0303	1	05/01/2019 12:58	WG1274486
Acrylonitrile	U		0.00230	0.0151	1	05/01/2019 12:58	WG1274486
Benzene	0.000853	J	0.000485	0.00121	1	05/01/2019 12:58	WG1274486
Bromobenzene	U		0.00127	0.0151	1	05/01/2019 12:58	WG1274486
Bromodichloromethane	U		0.000955	0.00303	1	05/01/2019 12:58	WG1274486
Bromoform	U		0.00724	0.0303	1	05/01/2019 12:58	WG1274486
Bromomethane	U		0.00448	0.0151	1	05/01/2019 12:58	WG1274486
n-Butylbenzene	U		0.00465	0.0151	1	05/01/2019 12:58	WG1274486
sec-Butylbenzene	U		0.00306	0.0151	1	05/01/2019 12:58	WG1274486
tert-Butylbenzene	U		0.00188	0.00606	1	05/01/2019 12:58	WG1274486
Carbon tetrachloride	U		0.00131	0.00606	1	05/01/2019 12:58	WG1274486
Chlorobenzene	U		0.000694	0.00303	1	05/01/2019 12:58	WG1274486
Chlorodibromomethane	U		0.000545	0.00303	1	05/01/2019 12:58	WG1274486
Chloroethane	U		0.00131	0.00606	1	05/01/2019 12:58	WG1274486
Chloroform	U		0.000503	0.00303	1	05/01/2019 12:58	WG1274486
Chloromethane	U		0.00168	0.0151	1	05/01/2019 12:58	WG1274486
2-Chlorotoluene	U		0.00111	0.00303	1	05/01/2019 12:58	WG1274486
4-Chlorotoluene	U		0.00137	0.00606	1	05/01/2019 12:58	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00618	0.0303	1	05/01/2019 12:58	WG1274486
1,2-Dibromoethane	U		0.000636	0.00303	1	05/01/2019 12:58	WG1274486
Dibromomethane	U		0.00121	0.00606	1	05/01/2019 12:58	WG1274486
1,2-Dichlorobenzene	U		0.00176	0.00606	1	05/01/2019 12:58	WG1274486
1,3-Dichlorobenzene	U		0.00206	0.00606	1	05/01/2019 12:58	WG1274486
1,4-Dichlorobenzene	U		0.00239	0.00606	1	05/01/2019 12:58	WG1274486
Dichlorodifluoromethane	U	J4	0.000991	0.00303	1	05/01/2019 12:58	WG1274486
1,1-Dichloroethane	U		0.000697	0.00303	1	05/01/2019 12:58	WG1274486
1,2-Dichloroethane	U		0.000575	0.00303	1	05/01/2019 12:58	WG1274486
1,1-Dichloroethene	U		0.000606	0.00303	1	05/01/2019 12:58	WG1274486
cis-1,2-Dichloroethene	U		0.000836	0.00303	1	05/01/2019 12:58	WG1274486
trans-1,2-Dichloroethene	U		0.00173	0.00606	1	05/01/2019 12:58	WG1274486
1,2-Dichloropropane	U		0.00154	0.00606	1	05/01/2019 12:58	WG1274486
1,1-Dichloropropene	U		0.000848	0.00303	1	05/01/2019 12:58	WG1274486
1,3-Dichloropropane	U		0.00212	0.00606	1	05/01/2019 12:58	WG1274486
cis-1,3-Dichloropropene	U		0.000821	0.00303	1	05/01/2019 12:58	WG1274486
trans-1,3-Dichloropropene	U		0.00185	0.00606	1	05/01/2019 12:58	WG1274486
2,2-Dichloropropane	U		0.000961	0.00303	1	05/01/2019 12:58	WG1274486
Di-isopropyl ether	U		0.000424	0.00121	1	05/01/2019 12:58	WG1274486
Ethylbenzene	0.00112	J	0.000642	0.00303	1	05/01/2019 12:58	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0154	0.0303	1	05/01/2019 12:58	WG1274486
Isopropylbenzene	U		0.00105	0.00303	1	05/01/2019 12:58	WG1274486
p-Isopropyltoluene	U		0.00282	0.00606	1	05/01/2019 12:58	WG1274486
2-Butanone (MEK)	U		0.0151	0.0303	1	05/01/2019 12:58	WG1274486
Methylene Chloride	U		0.00804	0.0303	1	05/01/2019 12:58	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0121	0.0303	1	05/01/2019 12:58	WG1274486
Methyl tert-butyl ether	U		0.000357	0.00121	1	05/01/2019 12:58	WG1274486
Naphthalene	0.00812	J	0.00378	0.0151	1	05/02/2019 14:11	WG1275175
n-Propylbenzene	U		0.00143	0.00606	1	05/01/2019 12:58	WG1274486
Styrene	U		0.00331	0.0151	1	05/01/2019 12:58	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000606	0.00303	1	05/01/2019 12:58	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000472	0.00303	1	05/01/2019 12:58	WG1274486

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.000818	0.00303	1	05/01/2019 12:58	WG1274486
Tetrachloroethene	0.00242	J	0.000848	0.00303	1	05/01/2019 12:58	WG1274486
Toluene	0.00430	J	0.00151	0.00606	1	05/01/2019 12:58	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.000757	0.00303	1	05/01/2019 12:58	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00584	0.0151	1	05/01/2019 12:58	WG1274486
1,1,1-Trichloroethane	U		0.000333	0.00303	1	05/01/2019 12:58	WG1274486
1,1,2-Trichloroethane	U		0.00107	0.00303	1	05/01/2019 12:58	WG1274486
Trichloroethene	U		0.000485	0.00121	1	05/01/2019 12:58	WG1274486
Trichlorofluoromethane	U		0.000606	0.00303	1	05/01/2019 12:58	WG1274486
1,2,3-Trichloropropane	U		0.00618	0.0151	1	05/01/2019 12:58	WG1274486
1,2,4-Trimethylbenzene	0.00405	J	0.00141	0.00606	1	05/01/2019 12:58	WG1274486
1,2,3-Trimethylbenzene	0.00299	J	0.00139	0.00606	1	05/01/2019 12:58	WG1274486
Vinyl chloride	U		0.000827	0.00303	1	05/01/2019 12:58	WG1274486
1,3,5-Trimethylbenzene	U		0.00131	0.00606	1	05/01/2019 12:58	WG1274486
Xylenes, Total	U		0.00579	0.00787	1	05/01/2019 12:58	WG1274486
(S) Toluene-d8	*109*			*75.0-131*		*05/01/2019 12:58*	WG1274486
(S) Toluene-d8	*108*			*75.0-131*		*05/02/2019 14:11*	WG1275175
(S) 4-Bromofluorobenzene	*95.9*			*67.0-138*		*05/01/2019 12:58*	WG1274486
(S) 4-Bromofluorobenzene	*95.2*			*67.0-138*		*05/02/2019 14:11*	WG1275175
(S) 1,2-Dichloroethane-d4	*101*			*70.0-130*		*05/01/2019 12:58*	WG1274486
(S) 1,2-Dichloroethane-d4	*98.6*			*70.0-130*		*05/02/2019 14:11*	WG1275175

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	0.118	J	0.0389	0.202	5	05/04/2019 17:45	WG1275198
Acenaphthylene	U		0.0406	0.202	5	05/04/2019 17:45	WG1275198
Anthracene	U		0.0383	0.202	5	05/04/2019 17:45	WG1275198
Benzo(a)anthracene	U		0.0259	0.202	5	05/04/2019 17:45	WG1275198
Benzo(b)fluoranthene	U		0.0420	0.202	5	05/04/2019 17:45	WG1275198
Benzo(k)fluoranthene	U		0.0353	0.202	5	05/04/2019 17:45	WG1275198
Benzo(g,h,i)perylene	U		0.0437	0.202	5	05/04/2019 17:45	WG1275198
Benzo(a)pyrene	U		0.0332	0.202	5	05/04/2019 17:45	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0466	2.02	5	05/04/2019 17:45	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.0543	2.02	5	05/04/2019 17:45	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0460	2.02	5	05/04/2019 17:45	WG1275198
4-Bromophenyl-phenylether	U		0.0691	2.02	5	05/04/2019 17:45	WG1275198
2-Chloronaphthalene	U		0.0388	0.202	5	05/04/2019 17:45	WG1275198
4-Chlorophenyl-phenylether	U		0.0380	2.02	5	05/04/2019 17:45	WG1275198
Chrysene	U		0.0337	0.202	5	05/04/2019 17:45	WG1275198
Dibenz(a,h)anthracene	U		0.0498	0.202	5	05/04/2019 17:45	WG1275198
3,3-Dichlorobenzidine	U		0.481	2.02	5	05/04/2019 17:45	WG1275198
2,4-Dinitrotoluene	U		0.0368	2.02	5	05/04/2019 17:45	WG1275198
2,6-Dinitrotoluene	U		0.0447	2.02	5	05/04/2019 17:45	WG1275198
Fluoranthene	U		0.0300	0.202	5	05/04/2019 17:45	WG1275198
Fluorene	0.0580	J	0.0413	0.202	5	05/04/2019 17:45	WG1275198
Hexachlorobenzene	U		0.0518	2.02	5	05/04/2019 17:45	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.0606	2.02	5	05/04/2019 17:45	WG1275198
Hexachlorocyclopentadiene	U	J3	0.355	2.02	5	05/04/2019 17:45	WG1275198
Hexachloroethane	U	J3	0.0812	2.02	5	05/04/2019 17:45	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0468	0.202	5	05/04/2019 17:45	WG1275198
Isophorone	U		0.0316	2.02	5	05/04/2019 17:45	WG1275198
Naphthalene	U	J3	0.0539	0.202	5	05/04/2019 17:45	WG1275198
Nitrobenzene	U	J3	0.0420	2.02	5	05/04/2019 17:45	WG1275198
n-Nitrosodimethylamine	U		0.391	2.02	5	05/04/2019 17:45	WG1275198
n-Nitrosodiphenylamine	U		0.545	2.02	5	05/04/2019 17:45	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
n-Nitrosodi-n-propylamine	U	J3	0.0549	2.02	5	05/04/2019 17:45	WG1275198
Phenanthrene	0.0532	J	0.0320	0.202	5	05/04/2019 17:45	WG1275198
Pyridine	U	J3	0.380	2.02	5	05/04/2019 17:45	WG1275198
Benzylbutyl phthalate	U		0.0624	2.02	5	05/04/2019 17:45	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.0727	2.02	5	05/04/2019 17:45	WG1275198
Di-n-butyl phthalate	U		0.0660	2.02	5	05/04/2019 17:45	WG1275198
Diethyl phthalate	U		0.0419	2.02	5	05/04/2019 17:45	WG1275198
Dimethyl phthalate	U		0.0327	2.02	5	05/04/2019 17:45	WG1275198
Di-n-octyl phthalate	U		0.0550	2.02	5	05/04/2019 17:45	WG1275198
Pyrene	U		0.0745	0.202	5	05/04/2019 17:45	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.0531	2.02	5	05/04/2019 17:45	WG1275198
4-Chloro-3-methylphenol	U		0.0290	2.02	5	05/04/2019 17:45	WG1275198
2-Chlorophenol	U	J3	0.0503	2.02	5	05/04/2019 17:45	WG1275198
2,4-Dichlorophenol	U		0.0452	2.02	5	05/04/2019 17:45	WG1275198
2,4-Dimethylphenol	U		0.286	2.02	5	05/04/2019 17:45	WG1275198
4,6-Dinitro-2-methylphenol	U		0.751	2.02	5	05/04/2019 17:45	WG1275198
2,4-Dinitrophenol	U	J3	0.594	2.02	5	05/04/2019 17:45	WG1275198
2-Methylphenol	U	J3	0.0597	2.02	5	05/04/2019 17:45	WG1275198
3&4-Methyl Phenol	U		0.0475	2.02	5	05/04/2019 17:45	WG1275198
2-Nitrophenol	U	J3	0.0787	2.02	5	05/04/2019 17:45	WG1275198
4-Nitrophenol	U		0.319	2.02	5	05/04/2019 17:45	WG1275198
Pentachlorophenol	U		0.291	2.02	5	05/04/2019 17:45	WG1275198
Phenol	U		0.0420	2.02	5	05/04/2019 17:45	WG1275198
2,4,6-Trichlorophenol	U		0.0471	2.02	5	05/04/2019 17:45	WG1275198
2,4,5-Trichlorophenol	U		0.0630	2.02	5	05/04/2019 17:45	WG1275198
(S) 2-Fluorophenol	*52.8*			*12.0-120*		*05/04/2019 17:45*	WG1275198
(S) Phenol-d5	*51.7*			*10.0-120*		*05/04/2019 17:45*	WG1275198
(S) Nitrobenzene-d5	*44.7*			*10.0-122*		*05/04/2019 17:45*	WG1275198
(S) 2-Fluorobiphenyl	*52.2*			*15.0-120*		*05/04/2019 17:45*	WG1275198
(S) 2,4,6-Tribromophenol	*61.0*			*10.0-127*		*05/04/2019 17:45*	WG1275198
(S) p-Terphenyl-d14	*60.7*			*10.0-120*		*05/04/2019 17:45*	WG1275198

Sample Narrative:

L1093844-01 WG1275198: Dilution due to viscosity.

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.3		1	05/03/2019 14:31	WG1275562

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	U		0.0157	0.0286	1	05/01/2019 13:17	WG1274486
Acrylonitrile	U		0.00218	0.0143	1	05/01/2019 13:17	WG1274486
Benzene	U		0.000458	0.00115	1	05/01/2019 13:17	WG1274486
Bromobenzene	U		0.00120	0.0143	1	05/01/2019 13:17	WG1274486
Bromodichloromethane	U		0.000903	0.00286	1	05/01/2019 13:17	WG1274486
Bromoform	U		0.00685	0.0286	1	05/01/2019 13:17	WG1274486
Bromomethane	U		0.00424	0.0143	1	05/01/2019 13:17	WG1274486
n-Butylbenzene	U		0.00440	0.0143	1	05/01/2019 13:17	WG1274486
sec-Butylbenzene	U		0.00290	0.0143	1	05/01/2019 13:17	WG1274486
tert-Butylbenzene	U		0.00178	0.00573	1	05/01/2019 13:17	WG1274486
Carbon tetrachloride	U		0.00124	0.00573	1	05/01/2019 13:17	WG1274486
Chlorobenzene	U		0.000657	0.00286	1	05/01/2019 13:17	WG1274486
Chlorodibromomethane	U		0.000516	0.00286	1	05/01/2019 13:17	WG1274486
Chloroethane	U		0.00124	0.00573	1	05/01/2019 13:17	WG1274486
Chloroform	U		0.000476	0.00286	1	05/01/2019 13:17	WG1274486
Chloromethane	U		0.00159	0.0143	1	05/01/2019 13:17	WG1274486
2-Chlorotoluene	U		0.00105	0.00286	1	05/01/2019 13:17	WG1274486
4-Chlorotoluene	U		0.00129	0.00573	1	05/01/2019 13:17	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00584	0.0286	1	05/01/2019 13:17	WG1274486
1,2-Dibromoethane	U		0.000602	0.00286	1	05/01/2019 13:17	WG1274486
Dibromomethane	U		0.00115	0.00573	1	05/01/2019 13:17	WG1274486
1,2-Dichlorobenzene	U		0.00166	0.00573	1	05/01/2019 13:17	WG1274486
1,3-Dichlorobenzene	U		0.00195	0.00573	1	05/01/2019 13:17	WG1274486
1,4-Dichlorobenzene	U		0.00226	0.00573	1	05/01/2019 13:17	WG1274486
Dichlorodifluoromethane	U	J4	0.000937	0.00286	1	05/01/2019 13:17	WG1274486
1,1-Dichloroethane	U		0.000659	0.00286	1	05/01/2019 13:17	WG1274486
1,2-Dichloroethane	U		0.000544	0.00286	1	05/01/2019 13:17	WG1274486
1,1-Dichloroethene	U		0.000573	0.00286	1	05/01/2019 13:17	WG1274486
cis-1,2-Dichloroethene	U		0.000791	0.00286	1	05/01/2019 13:17	WG1274486
trans-1,2-Dichloroethene	U		0.00164	0.00573	1	05/01/2019 13:17	WG1274486
1,2-Dichloropropane	U		0.00146	0.00573	1	05/01/2019 13:17	WG1274486
1,1-Dichloropropene	U		0.000802	0.00286	1	05/01/2019 13:17	WG1274486
1,3-Dichloropropane	U		0.00201	0.00573	1	05/01/2019 13:17	WG1274486
cis-1,3-Dichloropropene	U		0.000777	0.00286	1	05/01/2019 13:17	WG1274486
trans-1,3-Dichloropropene	U		0.00175	0.00573	1	05/01/2019 13:17	WG1274486
2,2-Dichloropropane	U		0.000909	0.00286	1	05/01/2019 13:17	WG1274486
Di-isopropyl ether	U		0.000401	0.00115	1	05/01/2019 13:17	WG1274486
Ethylbenzene	U		0.000607	0.00286	1	05/01/2019 13:17	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0146	0.0286	1	05/01/2019 13:17	WG1274486
Isopropylbenzene	U		0.000989	0.00286	1	05/01/2019 13:17	WG1274486
p-Isopropyltoluene	U		0.00267	0.00573	1	05/01/2019 13:17	WG1274486
2-Butanone (MEK)	U		0.0143	0.0286	1	05/01/2019 13:17	WG1274486
Methylene Chloride	U		0.00761	0.0286	1	05/01/2019 13:17	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0115	0.0286	1	05/01/2019 13:17	WG1274486
Methyl tert-butyl ether	U		0.000338	0.00115	1	05/01/2019 13:17	WG1274486
Naphthalene	U		0.00358	0.0143	1	05/01/2019 13:17	WG1274486
n-Propylbenzene	U		0.00135	0.00573	1	05/01/2019 13:17	WG1274486
Styrene	U		0.00313	0.0143	1	05/01/2019 13:17	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000573	0.00286	1	05/01/2019 13:17	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000447	0.00286	1	05/01/2019 13:17	WG1274486

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.000773	0.00286	1	05/01/2019 13:17	WG1274486
Tetrachloroethene	U		0.000802	0.00286	1	05/01/2019 13:17	WG1274486
Toluene	U		0.00143	0.00573	1	05/01/2019 13:17	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.000716	0.00286	1	05/01/2019 13:17	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00552	0.0143	1	05/01/2019 13:17	WG1274486
1,1,1-Trichloroethane	U		0.000315	0.00286	1	05/01/2019 13:17	WG1274486
1,1,2-Trichloroethane	U		0.00101	0.00286	1	05/01/2019 13:17	WG1274486
Trichloroethene	U		0.000458	0.00115	1	05/01/2019 13:17	WG1274486
Trichlorofluoromethane	U		0.000573	0.00286	1	05/01/2019 13:17	WG1274486
1,2,3-Trichloropropane	U		0.00584	0.0143	1	05/01/2019 13:17	WG1274486
1,2,4-Trimethylbenzene	U		0.00133	0.00573	1	05/01/2019 13:17	WG1274486
1,2,3-Trimethylbenzene	U		0.00132	0.00573	1	05/01/2019 13:17	WG1274486
Vinyl chloride	U		0.000783	0.00286	1	05/01/2019 13:17	WG1274486
1,3,5-Trimethylbenzene	U		0.00124	0.00573	1	05/01/2019 13:17	WG1274486
Xylenes, Total	U		0.00548	0.00745	1	05/01/2019 13:17	WG1274486
(S) Toluene-d8	*108*			*75.0-131*		*05/01/2019 13:17*	WG1274486
(S) 4-Bromofluorobenzene	*92.7*			*67.0-138*		*05/01/2019 13:17*	WG1274486
(S) 1,2-Dichloroethane-d4	*100*			*70.0-130*		*05/01/2019 13:17*	WG1274486

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.00225	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Benzo(a)pyrene	0.00248	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Benzo(b)fluoranthene	0.00335	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Benzo(k)fluoranthene	0.00106	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Chrysene	0.00223	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Dibenz(a,h)anthracene	U		0.000688	0.00688	1	05/03/2019 14:55	WG1275238
Indeno(1,2,3-cd)pyrene	0.00150	J	0.000688	0.00688	1	05/03/2019 14:55	WG1275238
(S) Nitrobenzene-d5	*75.9*			*14.0-149*		*05/03/2019 14:55*	WG1275238
(S) 2-Fluorobiphenyl	*74.0*			*34.0-125*		*05/03/2019 14:55*	WG1275238
(S) p-Terphenyl-d14	*76.7*			*23.0-120*		*05/03/2019 14:55*	WG1275238

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.0		1	05/03/2019 14:31	WG1275562

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0365	0.190	5	05/04/2019 17:07	WG1275198
Acenaphthylene	U		0.0381	0.190	5	05/04/2019 17:07	WG1275198
Anthracene	U		0.0359	0.190	5	05/04/2019 17:07	WG1275198
Benzo(a)anthracene	U		0.0243	0.190	5	05/04/2019 17:07	WG1275198
Benzo(b)fluoranthene	U		0.0394	0.190	5	05/04/2019 17:07	WG1275198
Benzo(k)fluoranthene	U		0.0331	0.190	5	05/04/2019 17:07	WG1275198
Benzo(g,h,i)perylene	U		0.0410	0.190	5	05/04/2019 17:07	WG1275198
Benzo(a)pyrene	U		0.0311	0.190	5	05/04/2019 17:07	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0438	1.90	5	05/04/2019 17:07	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.0509	1.90	5	05/04/2019 17:07	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0432	1.90	5	05/04/2019 17:07	WG1275198
4-Bromophenyl-phenylether	U		0.0648	1.90	5	05/04/2019 17:07	WG1275198
2-Chloronaphthalene	U		0.0364	0.190	5	05/04/2019 17:07	WG1275198
4-Chlorophenyl-phenylether	U		0.0357	1.90	5	05/04/2019 17:07	WG1275198
Chrysene	U		0.0316	0.190	5	05/04/2019 17:07	WG1275198
Dibenz(a,h)anthracene	U		0.0467	0.190	5	05/04/2019 17:07	WG1275198
3,3-Dichlorobenzidine	U		0.451	1.90	5	05/04/2019 17:07	WG1275198
2,4-Dinitrotoluene	U		0.0345	1.90	5	05/04/2019 17:07	WG1275198
2,6-Dinitrotoluene	U		0.0419	1.90	5	05/04/2019 17:07	WG1275198
Fluoranthene	U		0.0282	0.190	5	05/04/2019 17:07	WG1275198
Fluorene	U		0.0388	0.190	5	05/04/2019 17:07	WG1275198
Hexachlorobenzene	U		0.0486	1.90	5	05/04/2019 17:07	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.0568	1.90	5	05/04/2019 17:07	WG1275198
Hexachlorocyclopentadiene	U	J3	0.333	1.90	5	05/04/2019 17:07	WG1275198
Hexachloroethane	U	J3	0.0761	1.90	5	05/04/2019 17:07	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0439	0.190	5	05/04/2019 17:07	WG1275198
Isophorone	U		0.0297	1.90	5	05/04/2019 17:07	WG1275198
Naphthalene	U	J3	0.0506	0.190	5	05/04/2019 17:07	WG1275198
Nitrobenzene	U	J3	0.0394	1.90	5	05/04/2019 17:07	WG1275198
n-Nitrosodimethylamine	U		0.367	1.90	5	05/04/2019 17:07	WG1275198
n-Nitrosodiphenylamine	U		0.511	1.90	5	05/04/2019 17:07	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.0515	1.90	5	05/04/2019 17:07	WG1275198
Phenanthrene	U		0.0300	0.190	5	05/04/2019 17:07	WG1275198
Pyridine	U	J3	0.357	1.90	5	05/04/2019 17:07	WG1275198
Benzylbutyl phthalate	U		0.0585	1.90	5	05/04/2019 17:07	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.0682	1.90	5	05/04/2019 17:07	WG1275198
Di-n-butyl phthalate	U		0.0619	1.90	5	05/04/2019 17:07	WG1275198
Diethyl phthalate	U		0.0393	1.90	5	05/04/2019 17:07	WG1275198
Dimethyl phthalate	U		0.0307	1.90	5	05/04/2019 17:07	WG1275198
Di-n-octyl phthalate	U		0.0516	1.90	5	05/04/2019 17:07	WG1275198
Pyrene	U		0.0699	0.190	5	05/04/2019 17:07	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.0498	1.90	5	05/04/2019 17:07	WG1275198
4-Chloro-3-methylphenol	U		0.0272	1.90	5	05/04/2019 17:07	WG1275198
2-Chlorophenol	U	J3	0.0472	1.90	5	05/04/2019 17:07	WG1275198
2,4-Dichlorophenol	U		0.0424	1.90	5	05/04/2019 17:07	WG1275198
2,4-Dimethylphenol	U		0.268	1.90	5	05/04/2019 17:07	WG1275198
4,6-Dinitro-2-methylphenol	U		0.705	1.90	5	05/04/2019 17:07	WG1275198
2,4-Dinitrophenol	U	J3	0.557	1.90	5	05/04/2019 17:07	WG1275198
2-Methylphenol	U	J3	0.0560	1.90	5	05/04/2019 17:07	WG1275198
3&4-Methyl Phenol	U		0.0445	1.90	5	05/04/2019 17:07	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
2-Nitrophenol	U	J3	0.0739	1.90	5	05/04/2019 17:07	WG1275198
4-Nitrophenol	U		0.299	1.90	5	05/04/2019 17:07	WG1275198
Pentachlorophenol	U		0.273	1.90	5	05/04/2019 17:07	WG1275198
Phenol	U		0.0394	1.90	5	05/04/2019 17:07	WG1275198
2,4,6-Trichlorophenol	U		0.0442	1.90	5	05/04/2019 17:07	WG1275198
2,4,5-Trichlorophenol	U		0.0591	1.90	5	05/04/2019 17:07	WG1275198
(S) 2-Fluorophenol	*82.2*			*12.0-120*		*05/04/2019 17:07*	WG1275198
(S) Phenol-d5	*74.1*			*10.0-120*		*05/04/2019 17:07*	WG1275198
(S) Nitrobenzene-d5	*65.4*			*10.0-122*		*05/04/2019 17:07*	WG1275198
(S) 2-Fluorobiphenyl	*67.9*			*15.0-120*		*05/04/2019 17:07*	WG1275198
(S) 2,4,6-Tribromophenol	*65.1*			*10.0-127*		*05/04/2019 17:07*	WG1275198
(S) p-Terphenyl-d14	*82.9*			*10.0-120*		*05/04/2019 17:07*	WG1275198

Sample Narrative:

L1093844-04 WG1275198: Dilution due to viscosity.

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.00227	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Benzo(a)pyrene	0.00216	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Benzo(b)fluoranthene	0.00230	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Benzo(k)fluoranthene	0.000788	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Chrysene	0.00206	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Dibenz(a,h)anthracene	U		0.000682	0.00682	1	05/03/2019 15:16	WG1275238
Indeno(1,2,3-cd)pyrene	0.00105	J	0.000682	0.00682	1	05/03/2019 15:16	WG1275238
(S) Nitrobenzene-d5	*83.1*			*14.0-149*		*05/03/2019 15:16*	WG1275238
(S) 2-Fluorobiphenyl	*79.7*			*34.0-125*		*05/03/2019 15:16*	WG1275238
(S) p-Terphenyl-d14	*82.2*			*23.0-120*		*05/03/2019 15:16*	WG1275238

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.5		1	05/03/2019 14:31	WG1275562

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0371	0.193	5	05/04/2019 17:26	WG1275198
Acenaphthylene	U		0.0387	0.193	5	05/04/2019 17:26	WG1275198
Anthracene	0.0479	J	0.0365	0.193	5	05/04/2019 17:26	WG1275198
Benzo(a)anthracene	0.0992	J	0.0247	0.193	5	05/04/2019 17:26	WG1275198
Benzo(b)fluoranthene	0.0813	J	0.0401	0.193	5	05/04/2019 17:26	WG1275198
Benzo(k)fluoranthene	U		0.0336	0.193	5	05/04/2019 17:26	WG1275198
Benzo(g,h,i)perylene	0.0458	J	0.0417	0.193	5	05/04/2019 17:26	WG1275198
Benzo(a)pyrene	0.0810	J	0.0317	0.193	5	05/04/2019 17:26	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0445	1.93	5	05/04/2019 17:26	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.0518	1.93	5	05/04/2019 17:26	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0439	1.93	5	05/04/2019 17:26	WG1275198
4-Bromophenyl-phenylether	U		0.0659	1.93	5	05/04/2019 17:26	WG1275198
2-Chloronaphthalene	U		0.0370	0.193	5	05/04/2019 17:26	WG1275198
4-Chlorophenyl-phenylether	U		0.0363	1.93	5	05/04/2019 17:26	WG1275198
Chrysene	0.0891	J	0.0321	0.193	5	05/04/2019 17:26	WG1275198
Dibenz(a,h)anthracene	U		0.0475	0.193	5	05/04/2019 17:26	WG1275198
3,3-Dichlorobenzidine	U		0.459	1.93	5	05/04/2019 17:26	WG1275198
2,4-Dinitrotoluene	U		0.0351	1.93	5	05/04/2019 17:26	WG1275198
2,6-Dinitrotoluene	U		0.0427	1.93	5	05/04/2019 17:26	WG1275198
Fluoranthene	0.190	J	0.0287	0.193	5	05/04/2019 17:26	WG1275198
Fluorene	U		0.0394	0.193	5	05/04/2019 17:26	WG1275198
Hexachlorobenzene	U		0.0495	1.93	5	05/04/2019 17:26	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.0578	1.93	5	05/04/2019 17:26	WG1275198
Hexachlorocyclopentadiene	U	J3	0.339	1.93	5	05/04/2019 17:26	WG1275198
Hexachloroethane	U	J3	0.0775	1.93	5	05/04/2019 17:26	WG1275198
Indeno(1,2,3-cd)pyrene	0.0495	J	0.0446	0.193	5	05/04/2019 17:26	WG1275198
Isophorone	U		0.0302	1.93	5	05/04/2019 17:26	WG1275198
Naphthalene	U	J3	0.0514	0.193	5	05/04/2019 17:26	WG1275198
Nitrobenzene	U	J3	0.0401	1.93	5	05/04/2019 17:26	WG1275198
n-Nitrosodimethylamine	U		0.373	1.93	5	05/04/2019 17:26	WG1275198
n-Nitrosodiphenylamine	U		0.520	1.93	5	05/04/2019 17:26	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.0524	1.93	5	05/04/2019 17:26	WG1275198
Phenanthrene	0.116	J	0.0305	0.193	5	05/04/2019 17:26	WG1275198
Pyridine	U	J3	0.363	1.93	5	05/04/2019 17:26	WG1275198
Benzylbutyl phthalate	U		0.0595	1.93	5	05/04/2019 17:26	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.0694	1.93	5	05/04/2019 17:26	WG1275198
Di-n-butyl phthalate	U		0.0630	1.93	5	05/04/2019 17:26	WG1275198
Diethyl phthalate	U		0.0400	1.93	5	05/04/2019 17:26	WG1275198
Dimethyl phthalate	U		0.0312	1.93	5	05/04/2019 17:26	WG1275198
Di-n-octyl phthalate	U		0.0525	1.93	5	05/04/2019 17:26	WG1275198
Pyrene	0.187	J	0.0711	0.193	5	05/04/2019 17:26	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.0506	1.93	5	05/04/2019 17:26	WG1275198
4-Chloro-3-methylphenol	U		0.0276	1.93	5	05/04/2019 17:26	WG1275198
2-Chlorophenol	U	J3	0.0480	1.93	5	05/04/2019 17:26	WG1275198
2,4-Dichlorophenol	U		0.0431	1.93	5	05/04/2019 17:26	WG1275198
2,4-Dimethylphenol	U		0.273	1.93	5	05/04/2019 17:26	WG1275198
4,6-Dinitro-2-methylphenol	U		0.717	1.93	5	05/04/2019 17:26	WG1275198
2,4-Dinitrophenol	U	J3	0.567	1.93	5	05/04/2019 17:26	WG1275198
2-Methylphenol	U	J3	0.0570	1.93	5	05/04/2019 17:26	WG1275198
3&4-Methyl Phenol	U		0.0453	1.93	5	05/04/2019 17:26	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
2-Nitrophenol	U	J3	0.0751	1.93	5	05/04/2019 17:26	WG1275198
4-Nitrophenol	U		0.304	1.93	5	05/04/2019 17:26	WG1275198
Pentachlorophenol	U		0.277	1.93	5	05/04/2019 17:26	WG1275198
Phenol	U		0.0401	1.93	5	05/04/2019 17:26	WG1275198
2,4,6-Trichlorophenol	U		0.0450	1.93	5	05/04/2019 17:26	WG1275198
2,4,5-Trichlorophenol	U		0.0601	1.93	5	05/04/2019 17:26	WG1275198
(S) 2-Fluorophenol	*60.2*			*12.0-120*		*05/04/2019 17:26*	WG1275198
(S) Phenol-d5	*58.0*			*10.0-120*		*05/04/2019 17:26*	WG1275198
(S) Nitrobenzene-d5	*50.6*			*10.0-122*		*05/04/2019 17:26*	WG1275198
(S) 2-Fluorobiphenyl	*50.3*			*15.0-120*		*05/04/2019 17:26*	WG1275198
(S) 2,4,6-Tribromophenol	*61.4*			*10.0-127*		*05/04/2019 17:26*	WG1275198
(S) p-Terphenyl-d14	*57.0*			*10.0-120*		*05/04/2019 17:26*	WG1275198

Sample Narrative:

L1093844-05 WG1275198: Dilution due to viscosity.

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.00395	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Benzo(a)pyrene	0.00447	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Benzo(b)fluoranthene	0.00465	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Benzo(k)fluoranthene	0.00158	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Chrysene	0.00513	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Dibenz(a,h)anthracene	U		0.000694	0.00694	1	05/07/2019 12:19	WG1276612
Indeno(1,2,3-cd)pyrene	0.00185	J	0.000694	0.00694	1	05/07/2019 12:19	WG1276612
(S) Nitrobenzene-d5	*98.7*			*14.0-149*		*05/07/2019 12:19*	WG1276612
(S) 2-Fluorobiphenyl	*85.1*			*34.0-125*		*05/07/2019 12:19*	WG1276612
(S) p-Terphenyl-d14	*108*			*23.0-120*		*05/07/2019 12:19*	WG1276612

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	61.3		1	05/03/2019 14:31	WG1275562

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Acetone	U		0.0223	0.0408	1	05/01/2019 13:37	WG1274486
Acrylonitrile	U		0.00310	0.0204	1	05/01/2019 13:37	WG1274486
Benzene	U		0.000652	0.00163	1	05/01/2019 13:37	WG1274486
Bromobenzene	U		0.00171	0.0204	1	05/01/2019 13:37	WG1274486
Bromodichloromethane	U		0.00129	0.00408	1	05/01/2019 13:37	WG1274486
Bromoform	U		0.00975	0.0408	1	05/01/2019 13:37	WG1274486
Bromomethane	U		0.00603	0.0204	1	05/01/2019 13:37	WG1274486
n-Butylbenzene	U		0.00626	0.0204	1	05/01/2019 13:37	WG1274486
sec-Butylbenzene	U		0.00413	0.0204	1	05/01/2019 13:37	WG1274486
tert-Butylbenzene	U		0.00253	0.00815	1	05/01/2019 13:37	WG1274486
Carbon tetrachloride	U		0.00176	0.00815	1	05/01/2019 13:37	WG1274486
Chlorobenzene	U		0.000934	0.00408	1	05/01/2019 13:37	WG1274486
Chlorodibromomethane	U		0.000734	0.00408	1	05/01/2019 13:37	WG1274486
Chloroethane	U		0.00176	0.00815	1	05/01/2019 13:37	WG1274486
Chloroform	U		0.000677	0.00408	1	05/01/2019 13:37	WG1274486
Chloromethane	U		0.00227	0.0204	1	05/01/2019 13:37	WG1274486
2-Chlorotoluene	U		0.00150	0.00408	1	05/01/2019 13:37	WG1274486
4-Chlorotoluene	U		0.00184	0.00815	1	05/01/2019 13:37	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00832	0.0408	1	05/01/2019 13:37	WG1274486
1,2-Dibromoethane	U		0.000856	0.00408	1	05/01/2019 13:37	WG1274486
Dibromomethane	U		0.00163	0.00815	1	05/01/2019 13:37	WG1274486
1,2-Dichlorobenzene	U		0.00236	0.00815	1	05/01/2019 13:37	WG1274486
1,3-Dichlorobenzene	U		0.00277	0.00815	1	05/01/2019 13:37	WG1274486
1,4-Dichlorobenzene	U		0.00321	0.00815	1	05/01/2019 13:37	WG1274486
Dichlorodifluoromethane	U	J4	0.00133	0.00408	1	05/01/2019 13:37	WG1274486
1,1-Dichloroethane	U		0.000938	0.00408	1	05/01/2019 13:37	WG1274486
1,2-Dichloroethane	U		0.000775	0.00408	1	05/01/2019 13:37	WG1274486
1,1-Dichloroethene	U		0.000815	0.00408	1	05/01/2019 13:37	WG1274486
cis-1,2-Dichloroethene	U		0.00113	0.00408	1	05/01/2019 13:37	WG1274486
trans-1,2-Dichloroethene	U		0.00233	0.00815	1	05/01/2019 13:37	WG1274486
1,2-Dichloropropane	U		0.00207	0.00815	1	05/01/2019 13:37	WG1274486
1,1-Dichloropropene	U		0.00114	0.00408	1	05/01/2019 13:37	WG1274486
1,3-Dichloropropane	U		0.00285	0.00815	1	05/01/2019 13:37	WG1274486
cis-1,3-Dichloropropene	U		0.00111	0.00408	1	05/01/2019 13:37	WG1274486
trans-1,3-Dichloropropene	U		0.00250	0.00815	1	05/01/2019 13:37	WG1274486
2,2-Dichloropropane	U		0.00129	0.00408	1	05/01/2019 13:37	WG1274486
Di-isopropyl ether	U		0.000571	0.00163	1	05/01/2019 13:37	WG1274486
Ethylbenzene	U		0.000864	0.00408	1	05/01/2019 13:37	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0207	0.0408	1	05/01/2019 13:37	WG1274486
Isopropylbenzene	U		0.00141	0.00408	1	05/01/2019 13:37	WG1274486
p-Isopropyltoluene	U		0.00380	0.00815	1	05/01/2019 13:37	WG1274486
2-Butanone (MEK)	U		0.0204	0.0408	1	05/01/2019 13:37	WG1274486
Methylene Chloride	U		0.0108	0.0408	1	05/01/2019 13:37	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0163	0.0408	1	05/01/2019 13:37	WG1274486
Methyl tert-butyl ether	U		0.000481	0.00163	1	05/01/2019 13:37	WG1274486
Naphthalene	0.00883	J	0.00509	0.0204	1	05/02/2019 14:30	WG1275175
n-Propylbenzene	U		0.00192	0.00815	1	05/01/2019 13:37	WG1274486
Styrene	U		0.00445	0.0204	1	05/01/2019 13:37	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000815	0.00408	1	05/01/2019 13:37	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000636	0.00408	1	05/01/2019 13:37	WG1274486

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.00110	0.00408	1	05/01/2019 13:37	WG1274486
Tetrachloroethene	0.00162	J	0.00114	0.00408	1	05/01/2019 13:37	WG1274486
Toluene	0.00268	J	0.00204	0.00815	1	05/01/2019 13:37	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.00102	0.00408	1	05/01/2019 13:37	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00786	0.0204	1	05/01/2019 13:37	WG1274486
1,1,1-Trichloroethane	U		0.000448	0.00408	1	05/01/2019 13:37	WG1274486
1,1,2-Trichloroethane	U		0.00144	0.00408	1	05/01/2019 13:37	WG1274486
Trichloroethene	U		0.000652	0.00163	1	05/01/2019 13:37	WG1274486
Trichlorofluoromethane	U		0.000815	0.00408	1	05/01/2019 13:37	WG1274486
1,2,3-Trichloropropane	U		0.00832	0.0204	1	05/01/2019 13:37	WG1274486
1,2,4-Trimethylbenzene	U		0.00189	0.00815	1	05/01/2019 13:37	WG1274486
1,2,3-Trimethylbenzene	U		0.00188	0.00815	1	05/01/2019 13:37	WG1274486
Vinyl chloride	U		0.00111	0.00408	1	05/01/2019 13:37	WG1274486
1,3,5-Trimethylbenzene	U		0.00176	0.00815	1	05/01/2019 13:37	WG1274486
Xylenes, Total	U		0.00779	0.0106	1	05/01/2019 13:37	WG1274486
(S) Toluene-d8	*107*			*75.0-131*		*05/01/2019 13:37*	WG1274486
(S) Toluene-d8	*106*			*75.0-131*		*05/02/2019 14:30*	WG1275175
(S) 4-Bromofluorobenzene	*94.0*			*67.0-138*		*05/01/2019 13:37*	WG1274486
(S) 4-Bromofluorobenzene	*92.7*			*67.0-138*		*05/02/2019 14:30*	WG1275175
(S) 1,2-Dichloroethane-d4	*98.6*			*70.0-130*		*05/01/2019 13:37*	WG1274486
(S) 1,2-Dichloroethane-d4	*99.1*			*70.0-130*		*05/02/2019 14:30*	WG1275175

GP-MW-16-SS

Collected date/time: 04/26/19 13:15

SAMPLE RESULTS - 07

L1093844

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.0		1	05/03/2019 14:31	WG1275562

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	62.7		15.7	47.1	10	05/02/2019 22:43	WG1274928
Residual Range Organics (RRO)	604		39.2	118	10	05/02/2019 22:43	WG1274928
(S) o-Terphenyl	*44.7*			*18.0-148*		*05/02/2019 22:43*	WG1274928

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0756	0.392	10	05/06/2019 17:36	WG1275198
Acenaphthylene	U		0.0790	0.392	10	05/06/2019 17:36	WG1275198
Anthracene	U		0.0744	0.392	10	05/06/2019 17:36	WG1275198
Benzo(a)anthracene	U		0.0504	0.392	10	05/06/2019 17:36	WG1275198
Benzo(b)fluoranthene	U		0.0818	0.392	10	05/06/2019 17:36	WG1275198
Benzo(k)fluoranthene	U		0.0685	0.392	10	05/06/2019 17:36	WG1275198
Benzo(g,h,i)perylene	U		0.0849	0.392	10	05/06/2019 17:36	WG1275198
Benzo(a)pyrene	U		0.0645	0.392	10	05/06/2019 17:36	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0906	3.92	10	05/06/2019 17:36	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.105	3.92	10	05/06/2019 17:36	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0894	3.92	10	05/06/2019 17:36	WG1275198
4-Bromophenyl-phenylether	U		0.134	3.92	10	05/06/2019 17:36	WG1275198
2-Chloronaphthalene	U		0.0752	0.392	10	05/06/2019 17:36	WG1275198
4-Chlorophenyl-phenylether	U		0.0738	3.92	10	05/06/2019 17:36	WG1275198
Chrysene	U		0.0653	0.392	10	05/06/2019 17:36	WG1275198
Dibenz(a,h)anthracene	U		0.0966	0.392	10	05/06/2019 17:36	WG1275198
3,3-Dichlorobenzidine	U		0.935	3.92	10	05/06/2019 17:36	WG1275198
2,4-Dinitrotoluene	U		0.0714	3.92	10	05/06/2019 17:36	WG1275198
2,6-Dinitrotoluene	U		0.0867	3.92	10	05/06/2019 17:36	WG1275198
Fluoranthene	U		0.0584	0.392	10	05/06/2019 17:36	WG1275198
Fluorene	U		0.0803	0.392	10	05/06/2019 17:36	WG1275198
Hexachlorobenzene	U		0.101	3.92	10	05/06/2019 17:36	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.118	3.92	10	05/06/2019 17:36	WG1275198
Hexachlorocyclopentadiene	U	J0 J3	0.691	3.92	10	05/06/2019 17:36	WG1275198
Hexachloroethane	U	J3	0.158	3.92	10	05/06/2019 17:36	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0909	0.392	10	05/06/2019 17:36	WG1275198
Isophorone	U		0.0614	3.92	10	05/06/2019 17:36	WG1275198
Naphthalene	U	J3	0.105	0.392	10	05/06/2019 17:36	WG1275198
Nitrobenzene	U	J3	0.0818	3.92	10	05/06/2019 17:36	WG1275198
n-Nitrosodimethylamine	U		0.761	3.92	10	05/06/2019 17:36	WG1275198
n-Nitrosodiphenylamine	U		1.06	3.92	10	05/06/2019 17:36	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.107	3.92	10	05/06/2019 17:36	WG1275198
Phenanthrene	U		0.0621	0.392	10	05/06/2019 17:36	WG1275198
Pyridine	U	J3	0.739	3.92	10	05/06/2019 17:36	WG1275198
Benzylbutyl phthalate	U		0.121	3.92	10	05/06/2019 17:36	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.141	3.92	10	05/06/2019 17:36	WG1275198
Di-n-butyl phthalate	U		0.128	3.92	10	05/06/2019 17:36	WG1275198
Diethyl phthalate	U		0.0813	3.92	10	05/06/2019 17:36	WG1275198
Dimethyl phthalate	U		0.0636	3.92	10	05/06/2019 17:36	WG1275198
Di-n-octyl phthalate	U		0.107	3.92	10	05/06/2019 17:36	WG1275198
Pyrene	U		0.145	0.392	10	05/06/2019 17:36	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.103	3.92	10	05/06/2019 17:36	WG1275198
4-Chloro-3-methylphenol	U		0.0561	3.92	10	05/06/2019 17:36	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
2-Chlorophenol	U	J3	0.0978	3.92	10	05/06/2019 17:36	WG1275198
2,4-Dichlorophenol	U		0.0878	3.92	10	05/06/2019 17:36	WG1275198
2,4-Dimethylphenol	U	J0	0.554	3.92	10	05/06/2019 17:36	WG1275198
4,6-Dinitro-2-methylphenol	U		1.46	3.92	10	05/06/2019 17:36	WG1275198
2,4-Dinitrophenol	U	J3	1.15	3.92	10	05/06/2019 17:36	WG1275198
2-Methylphenol	U	J3	0.116	3.92	10	05/06/2019 17:36	WG1275198
3&4-Methyl Phenol	U		0.0922	3.92	10	05/06/2019 17:36	WG1275198
2-Nitrophenol	U	J3	0.153	3.92	10	05/06/2019 17:36	WG1275198
4-Nitrophenol	U		0.618	3.92	10	05/06/2019 17:36	WG1275198
Pentachlorophenol	U		0.565	3.92	10	05/06/2019 17:36	WG1275198
Phenol	U		0.0818	3.92	10	05/06/2019 17:36	WG1275198
2,4,6-Trichlorophenol	U		0.0917	3.92	10	05/06/2019 17:36	WG1275198
2,4,5-Trichlorophenol	U		0.122	3.92	10	05/06/2019 17:36	WG1275198
(S) 2-Fluorophenol	*75.8*			*12.0-120*		*05/06/2019 17:36*	WG1275198
(S) Phenol-d5	*69.3*			*10.0-120*		*05/06/2019 17:36*	WG1275198
(S) Nitrobenzene-d5	*61.3*			*10.0-122*		*05/06/2019 17:36*	WG1275198
(S) 2-Fluorobiphenyl	*60.4*			*15.0-120*		*05/06/2019 17:36*	WG1275198
(S) 2,4,6-Tribromophenol	*62.4*			*10.0-127*		*05/06/2019 17:36*	WG1275198
(S) p-Terphenyl-d14	*64.7*			*10.0-120*		*05/06/2019 17:36*	WG1275198

Sample Narrative:

L1093844-07 WG1275198: Dilution due to matrix impact during extract concentration procedure

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.00551	J	0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Benzo(a)pyrene	0.00630	J	0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Benzo(b)fluoranthene	0.0109		0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Benzo(k)fluoranthene	0.00271	J	0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Chrysene	0.0214		0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Dibenz(a,h)anthracene	U		0.000706	0.00706	1	05/07/2019 13:44	WG1276612
Indeno(1,2,3-cd)pyrene	0.00231	J	0.000706	0.00706	1	05/07/2019 13:44	WG1276612
(S) Nitrobenzene-d5	*89.7*			*14.0-149*		*05/07/2019 13:44*	WG1276612
(S) 2-Fluorobiphenyl	*76.4*			*34.0-125*		*05/07/2019 13:44*	WG1276612
(S) p-Terphenyl-d14	*79.7*			*23.0-120*		*05/07/2019 13:44*	WG1276612

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.5		1	05/03/2019 14:31	WG1275562

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	U		0.0170	0.0311	1	05/01/2019 13:57	WG1274486
Acrylonitrile	U		0.00236	0.0155	1	05/01/2019 13:57	WG1274486
Benzene	U		0.000497	0.00124	1	05/01/2019 13:57	WG1274486
Bromobenzene	U		0.00130	0.0155	1	05/01/2019 13:57	WG1274486
Bromodichloromethane	U		0.000979	0.00311	1	05/01/2019 13:57	WG1274486
Bromoform	U		0.00743	0.0311	1	05/01/2019 13:57	WG1274486
Bromomethane	U		0.00460	0.0155	1	05/01/2019 13:57	WG1274486
n-Butylbenzene	U		0.00477	0.0155	1	05/01/2019 13:57	WG1274486
sec-Butylbenzene	U		0.00314	0.0155	1	05/01/2019 13:57	WG1274486
tert-Butylbenzene	U		0.00193	0.00621	1	05/01/2019 13:57	WG1274486
Carbon tetrachloride	U		0.00134	0.00621	1	05/01/2019 13:57	WG1274486
Chlorobenzene	U		0.000712	0.00311	1	05/01/2019 13:57	WG1274486
Chlorodibromomethane	U		0.000559	0.00311	1	05/01/2019 13:57	WG1274486
Chloroethane	U		0.00134	0.00621	1	05/01/2019 13:57	WG1274486
Chloroform	U		0.000516	0.00311	1	05/01/2019 13:57	WG1274486
Chloromethane	U		0.00173	0.0155	1	05/01/2019 13:57	WG1274486
2-Chlorotoluene	U		0.00114	0.00311	1	05/01/2019 13:57	WG1274486
4-Chlorotoluene	U		0.00140	0.00621	1	05/01/2019 13:57	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00634	0.0311	1	05/01/2019 13:57	WG1274486
1,2-Dibromoethane	U		0.000652	0.00311	1	05/01/2019 13:57	WG1274486
Dibromomethane	U		0.00124	0.00621	1	05/01/2019 13:57	WG1274486
1,2-Dichlorobenzene	U		0.00180	0.00621	1	05/01/2019 13:57	WG1274486
1,3-Dichlorobenzene	U		0.00211	0.00621	1	05/01/2019 13:57	WG1274486
1,4-Dichlorobenzene	U		0.00245	0.00621	1	05/01/2019 13:57	WG1274486
Dichlorodifluoromethane	U	J4	0.00102	0.00311	1	05/01/2019 13:57	WG1274486
1,1-Dichloroethane	U		0.000714	0.00311	1	05/01/2019 13:57	WG1274486
1,2-Dichloroethane	U		0.000590	0.00311	1	05/01/2019 13:57	WG1274486
1,1-Dichloroethene	U		0.000621	0.00311	1	05/01/2019 13:57	WG1274486
cis-1,2-Dichloroethene	U		0.000857	0.00311	1	05/01/2019 13:57	WG1274486
trans-1,2-Dichloroethene	U		0.00178	0.00621	1	05/01/2019 13:57	WG1274486
1,2-Dichloropropane	U		0.00158	0.00621	1	05/01/2019 13:57	WG1274486
1,1-Dichloropropene	U		0.000870	0.00311	1	05/01/2019 13:57	WG1274486
1,3-Dichloropropane	U		0.00217	0.00621	1	05/01/2019 13:57	WG1274486
cis-1,3-Dichloropropene	U		0.000842	0.00311	1	05/01/2019 13:57	WG1274486
trans-1,3-Dichloropropene	U		0.00190	0.00621	1	05/01/2019 13:57	WG1274486
2,2-Dichloropropane	U		0.000985	0.00311	1	05/01/2019 13:57	WG1274486
Di-isopropyl ether	U		0.000435	0.00124	1	05/01/2019 13:57	WG1274486
Ethylbenzene	U		0.000658	0.00311	1	05/01/2019 13:57	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0158	0.0311	1	05/01/2019 13:57	WG1274486
Isopropylbenzene	U		0.00107	0.00311	1	05/01/2019 13:57	WG1274486
p-Isopropyltoluene	U		0.00289	0.00621	1	05/01/2019 13:57	WG1274486
2-Butanone (MEK)	U		0.0155	0.0311	1	05/01/2019 13:57	WG1274486
Methylene Chloride	U		0.00825	0.0311	1	05/01/2019 13:57	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0124	0.0311	1	05/01/2019 13:57	WG1274486
Methyl tert-butyl ether	U		0.000367	0.00124	1	05/01/2019 13:57	WG1274486
Naphthalene	U		0.00388	0.0155	1	05/01/2019 13:57	WG1274486
n-Propylbenzene	U		0.00147	0.00621	1	05/01/2019 13:57	WG1274486
Styrene	U		0.00339	0.0155	1	05/01/2019 13:57	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000621	0.00311	1	05/01/2019 13:57	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000485	0.00311	1	05/01/2019 13:57	WG1274486

GP-MW-17-SS

Collected date/time: 04/26/19 14:50

SAMPLE RESULTS - 08

L1093844

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.000839	0.00311	1	05/01/2019 13:57	WG1274486
Tetrachloroethene	0.000919	J	0.000870	0.00311	1	05/01/2019 13:57	WG1274486
Toluene	U		0.00155	0.00621	1	05/01/2019 13:57	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.000777	0.00311	1	05/01/2019 13:57	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00599	0.0155	1	05/01/2019 13:57	WG1274486
1,1,1-Trichloroethane	U		0.000342	0.00311	1	05/01/2019 13:57	WG1274486
1,1,2-Trichloroethane	U		0.00110	0.00311	1	05/01/2019 13:57	WG1274486
Trichloroethene	U		0.000497	0.00124	1	05/01/2019 13:57	WG1274486
Trichlorofluoromethane	U		0.000621	0.00311	1	05/01/2019 13:57	WG1274486
1,2,3-Trichloropropane	U		0.00634	0.0155	1	05/01/2019 13:57	WG1274486
1,2,4-Trimethylbenzene	U		0.00144	0.00621	1	05/01/2019 13:57	WG1274486
1,2,3-Trimethylbenzene	U		0.00143	0.00621	1	05/01/2019 13:57	WG1274486
Vinyl chloride	U		0.000849	0.00311	1	05/01/2019 13:57	WG1274486
1,3,5-Trimethylbenzene	U		0.00134	0.00621	1	05/01/2019 13:57	WG1274486
Xylenes, Total	U		0.00594	0.00808	1	05/01/2019 13:57	WG1274486
(S) Toluene-d8	*108*			*75.0-131*		*05/01/2019 13:57*	WG1274486
(S) 4-Bromofluorobenzene	*93.8*			*67.0-138*		*05/01/2019 13:57*	WG1274486
(S) 1,2-Dichloroethane-d4	*98.3*			*70.0-130*		*05/01/2019 13:57*	WG1274486

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	3.81	J	1.65	4.97	1	05/02/2019 21:25	WG1274928
Residual Range Organics (RRO)	11.1	J	4.14	12.4	1	05/02/2019 21:25	WG1274928
(S) o-Terphenyl	*89.0*			*18.0-148*		*05/02/2019 21:25*	WG1274928

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0399	0.207	5	05/06/2019 19:32	WG1275198
Acenaphthylene	U		0.0416	0.207	5	05/06/2019 19:32	WG1275198
Anthracene	U		0.0393	0.207	5	05/06/2019 19:32	WG1275198
Benzo(a)anthracene	U		0.0266	0.207	5	05/06/2019 19:32	WG1275198
Benzo(b)fluoranthene	U		0.0431	0.207	5	05/06/2019 19:32	WG1275198
Benzo(k)fluoranthene	U		0.0362	0.207	5	05/06/2019 19:32	WG1275198
Benzo(g,h,i)perylene	U		0.0449	0.207	5	05/06/2019 19:32	WG1275198
Benzo(a)pyrene	U		0.0340	0.207	5	05/06/2019 19:32	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.00957	0.414	1	05/04/2019 16:47	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.0111	0.414	1	05/04/2019 16:47	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.00944	0.414	1	05/04/2019 16:47	WG1275198
4-Bromophenyl-phenylether	U		0.0708	2.07	5	05/06/2019 19:32	WG1275198
2-Chloronaphthalene	U		0.0398	0.207	5	05/06/2019 19:32	WG1275198
4-Chlorophenyl-phenylether	U		0.0390	2.07	5	05/06/2019 19:32	WG1275198
Chrysene	U		0.0345	0.207	5	05/06/2019 19:32	WG1275198
Dibenz(a,h)anthracene	U		0.0511	0.207	5	05/06/2019 19:32	WG1275198
3,3-Dichlorobenzidine	U		0.493	2.07	5	05/06/2019 19:32	WG1275198
2,4-Dinitrotoluene	U		0.0378	2.07	5	05/06/2019 19:32	WG1275198
2,6-Dinitrotoluene	U		0.0458	2.07	5	05/06/2019 19:32	WG1275198
Fluoranthene	U		0.0308	0.207	5	05/06/2019 19:32	WG1275198
Fluorene	U		0.0424	0.207	5	05/06/2019 19:32	WG1275198
Hexachlorobenzene	U		0.0532	2.07	5	05/06/2019 19:32	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.0124	0.414	1	05/04/2019 16:47	WG1275198
Hexachlorocyclopentadiene	U	J0 J3	0.364	2.07	5	05/06/2019 19:32	WG1275198
Hexachloroethane	U	J3	0.0166	0.414	1	05/04/2019 16:47	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0480	0.207	5	05/06/2019 19:32	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Isophorone	U		0.00649	0.414	1	05/04/2019 16:47	WG1275198
Naphthalene	U	J3	0.0110	0.0414	1	05/04/2019 16:47	WG1275198
Nitrobenzene	U	J3	0.00863	0.414	1	05/04/2019 16:47	WG1275198
n-Nitrosodimethylamine	U		0.0804	0.414	1	05/04/2019 16:47	WG1275198
n-Nitrosodiphenylamine	U		0.559	2.07	5	05/06/2019 19:32	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.0113	0.414	1	05/04/2019 16:47	WG1275198
Phenanthrene	U		0.0328	0.207	5	05/06/2019 19:32	WG1275198
Pyridine	U	J3	0.0780	0.414	1	05/04/2019 16:47	WG1275198
Benzylbutyl phthalate	U		0.0640	2.07	5	05/06/2019 19:32	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.0745	2.07	5	05/06/2019 19:32	WG1275198
Di-n-butyl phthalate	U		0.0677	2.07	5	05/06/2019 19:32	WG1275198
Diethyl phthalate	U		0.0430	2.07	5	05/06/2019 19:32	WG1275198
Dimethyl phthalate	U		0.0335	2.07	5	05/06/2019 19:32	WG1275198
Di-n-octyl phthalate	U		0.0564	2.07	5	05/06/2019 19:32	WG1275198
Pyrene	U		0.0764	0.207	5	05/06/2019 19:32	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.0109	0.414	1	05/04/2019 16:47	WG1275198
4-Chloro-3-methylphenol	U		0.00593	0.414	1	05/04/2019 16:47	WG1275198
2-Chlorophenol	U	J3	0.0103	0.414	1	05/04/2019 16:47	WG1275198
2,4-Dichlorophenol	U		0.00927	0.414	1	05/04/2019 16:47	WG1275198
2,4-Dimethylphenol	U		0.0585	0.414	1	05/04/2019 16:47	WG1275198
4,6-Dinitro-2-methylphenol	U		0.770	2.07	5	05/06/2019 19:32	WG1275198
2,4-Dinitrophenol	U	J3	0.609	2.07	5	05/06/2019 19:32	WG1275198
2-Methylphenol	U	J3	0.0123	0.414	1	05/04/2019 16:47	WG1275198
3&4-Methyl Phenol	U		0.00973	0.414	1	05/04/2019 16:47	WG1275198
2-Nitrophenol	U	J3	0.0162	0.414	1	05/04/2019 16:47	WG1275198
4-Nitrophenol	U		0.327	2.07	5	05/06/2019 19:32	WG1275198
Pentachlorophenol	U		0.298	2.07	5	05/06/2019 19:32	WG1275198
Phenol	U		0.00863	0.414	1	05/04/2019 16:47	WG1275198
2,4,6-Trichlorophenol	U		0.0483	2.07	5	05/06/2019 19:32	WG1275198
2,4,5-Trichlorophenol	U		0.0646	2.07	5	05/06/2019 19:32	WG1275198
(S) 2-Fluorophenol	*48.5*			*12.0-120*		*05/04/2019 16:47*	WG1275198
(S) 2-Fluorophenol	*66.8*			*12.0-120*		*05/06/2019 19:32*	WG1275198
(S) Phenol-d5	*48.5*			*10.0-120*		*05/04/2019 16:47*	WG1275198
(S) Phenol-d5	*65.2*			*10.0-120*		*05/06/2019 19:32*	WG1275198
(S) Nitrobenzene-d5	*54.3*			*10.0-122*		*05/06/2019 19:32*	WG1275198
(S) Nitrobenzene-d5	*38.1*			*10.0-122*		*05/04/2019 16:47*	WG1275198
(S) 2-Fluorobiphenyl	*40.5*			*15.0-120*		*05/04/2019 16:47*	WG1275198
(S) 2-Fluorobiphenyl	*51.8*			*15.0-120*		*05/06/2019 19:32*	WG1275198
(S) 2,4,6-Tribromophenol	*55.5*			*10.0-127*		*05/04/2019 16:47*	WG1275198
(S) 2,4,6-Tribromophenol	*73.5*			*10.0-127*		*05/06/2019 19:32*	WG1275198
(S) p-Terphenyl-d14	*76.2*			*10.0-120*		*05/06/2019 19:32*	WG1275198
(S) p-Terphenyl-d14	*52.4*			*10.0-120*		*05/04/2019 16:47*	WG1275198

Sample Narrative:

L1093844-08 WG1275198: IS/SURR failed on lower dilution.

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)anthracene	0.00486	J	0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Benzo(a)pyrene	0.00609	J	0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Benzo(b)fluoranthene	0.0118		0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Benzo(k)fluoranthene	0.00358	J	0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Chrysene	0.00968		0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Dibenz(a,h)anthracene	0.00128	J	0.000745	0.00745	1	05/07/2019 12:41	WG1276612
Indeno(1,2,3-cd)pyrene	0.00434	J	0.000745	0.00745	1	05/07/2019 12:41	WG1276612

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
(S) Nitrobenzene-d5	*105*			*14.0-149*		*05/07/2019 12:41*	WG1276612
(S) 2-Fluorobiphenyl	*85.0*			*34.0-125*		*05/07/2019 12:41*	WG1276612
(S) p-Terphenyl-d14	*113*			*23.0-120*		*05/07/2019 12:41*	WG1276612

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.0		1	05/03/2019 14:31	WG1275562

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	U		0.0161	0.0294	1	05/01/2019 14:16	WG1274486
Acrylonitrile	U		0.00224	0.0147	1	05/01/2019 14:16	WG1274486
Benzene	0.000507	J	0.000471	0.00118	1	05/01/2019 14:16	WG1274486
Bromobenzene	U		0.00124	0.0147	1	05/01/2019 14:16	WG1274486
Bromodichloromethane	U		0.000928	0.00294	1	05/01/2019 14:16	WG1274486
Bromoform	U		0.00704	0.0294	1	05/01/2019 14:16	WG1274486
Bromomethane	U		0.00436	0.0147	1	05/01/2019 14:16	WG1274486
n-Butylbenzene	U		0.00452	0.0147	1	05/01/2019 14:16	WG1274486
sec-Butylbenzene	U		0.00298	0.0147	1	05/01/2019 14:16	WG1274486
tert-Butylbenzene	U		0.00182	0.00589	1	05/01/2019 14:16	WG1274486
Carbon tetrachloride	U		0.00127	0.00589	1	05/01/2019 14:16	WG1274486
Chlorobenzene	U		0.000674	0.00294	1	05/01/2019 14:16	WG1274486
Chlorodibromomethane	U		0.000530	0.00294	1	05/01/2019 14:16	WG1274486
Chloroethane	U		0.00127	0.00589	1	05/01/2019 14:16	WG1274486
Chloroform	U		0.000488	0.00294	1	05/01/2019 14:16	WG1274486
Chloromethane	U		0.00164	0.0147	1	05/01/2019 14:16	WG1274486
2-Chlorotoluene	U		0.00108	0.00294	1	05/01/2019 14:16	WG1274486
4-Chlorotoluene	U		0.00133	0.00589	1	05/01/2019 14:16	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00600	0.0294	1	05/01/2019 14:16	WG1274486
1,2-Dibromoethane	U		0.000618	0.00294	1	05/01/2019 14:16	WG1274486
Dibromomethane	U		0.00118	0.00589	1	05/01/2019 14:16	WG1274486
1,2-Dichlorobenzene	U		0.00171	0.00589	1	05/01/2019 14:16	WG1274486
1,3-Dichlorobenzene	U		0.00200	0.00589	1	05/01/2019 14:16	WG1274486
1,4-Dichlorobenzene	U		0.00232	0.00589	1	05/01/2019 14:16	WG1274486
Dichlorodifluoromethane	U	J4	0.000963	0.00294	1	05/01/2019 14:16	WG1274486
1,1-Dichloroethane	U		0.000677	0.00294	1	05/01/2019 14:16	WG1274486
1,2-Dichloroethane	U		0.000559	0.00294	1	05/01/2019 14:16	WG1274486
1,1-Dichloroethene	U		0.000589	0.00294	1	05/01/2019 14:16	WG1274486
cis-1,2-Dichloroethene	U		0.000812	0.00294	1	05/01/2019 14:16	WG1274486
trans-1,2-Dichloroethene	U		0.00168	0.00589	1	05/01/2019 14:16	WG1274486
1,2-Dichloropropane	U		0.00149	0.00589	1	05/01/2019 14:16	WG1274486
1,1-Dichloropropene	U		0.000824	0.00294	1	05/01/2019 14:16	WG1274486
1,3-Dichloropropane	U		0.00206	0.00589	1	05/01/2019 14:16	WG1274486
cis-1,3-Dichloropropene	U		0.000798	0.00294	1	05/01/2019 14:16	WG1274486
trans-1,3-Dichloropropene	U		0.00180	0.00589	1	05/01/2019 14:16	WG1274486
2,2-Dichloropropane	U		0.000933	0.00294	1	05/01/2019 14:16	WG1274486
Di-isopropyl ether	U		0.000412	0.00118	1	05/01/2019 14:16	WG1274486
Ethylbenzene	U		0.000624	0.00294	1	05/01/2019 14:16	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0149	0.0294	1	05/01/2019 14:16	WG1274486
Isopropylbenzene	U		0.00102	0.00294	1	05/01/2019 14:16	WG1274486
p-Isopropyltoluene	U		0.00274	0.00589	1	05/01/2019 14:16	WG1274486
2-Butanone (MEK)	U		0.0147	0.0294	1	05/01/2019 14:16	WG1274486
Methylene Chloride	U		0.00782	0.0294	1	05/01/2019 14:16	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0118	0.0294	1	05/01/2019 14:16	WG1274486
Methyl tert-butyl ether	U		0.000347	0.00118	1	05/01/2019 14:16	WG1274486
Naphthalene	U		0.00367	0.0147	1	05/01/2019 14:16	WG1274486
n-Propylbenzene	U		0.00139	0.00589	1	05/01/2019 14:16	WG1274486
Styrene	U		0.00321	0.0147	1	05/01/2019 14:16	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000589	0.00294	1	05/01/2019 14:16	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000459	0.00294	1	05/01/2019 14:16	WG1274486

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.000795	0.00294	1	05/01/2019 14:16	WG1274486
Tetrachloroethene	U		0.000824	0.00294	1	05/01/2019 14:16	WG1274486
Toluene	U		0.00147	0.00589	1	05/01/2019 14:16	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.000736	0.00294	1	05/01/2019 14:16	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00567	0.0147	1	05/01/2019 14:16	WG1274486
1,1,1-Trichloroethane	U		0.000324	0.00294	1	05/01/2019 14:16	WG1274486
1,1,2-Trichloroethane	U		0.00104	0.00294	1	05/01/2019 14:16	WG1274486
Trichloroethene	U		0.000471	0.00118	1	05/01/2019 14:16	WG1274486
Trichlorofluoromethane	U		0.000589	0.00294	1	05/01/2019 14:16	WG1274486
1,2,3-Trichloropropane	U		0.00600	0.0147	1	05/01/2019 14:16	WG1274486
1,2,4-Trimethylbenzene	0.00167	J	0.00137	0.00589	1	05/01/2019 14:16	WG1274486
1,2,3-Trimethylbenzene	U		0.00135	0.00589	1	05/01/2019 14:16	WG1274486
Vinyl chloride	U		0.000804	0.00294	1	05/01/2019 14:16	WG1274486
1,3,5-Trimethylbenzene	U		0.00127	0.00589	1	05/01/2019 14:16	WG1274486
Xylenes, Total	U		0.00563	0.00765	1	05/01/2019 14:16	WG1274486
(S) Toluene-d8	*107*			*75.0-131*		*05/01/2019 14:16*	WG1274486
(S) 4-Bromofluorobenzene	*90.5*			*67.0-138*		*05/01/2019 14:16*	WG1274486
(S) 1,2-Dichloroethane-d4	*102*			*70.0-130*		*05/01/2019 14:16*	WG1274486

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		15.7	47.1	10	05/02/2019 23:09	WG1274928
Residual Range Organics (RRO)	75.0	J	39.2	118	10	05/02/2019 23:09	WG1274928
(S) o-Terphenyl	*83.2*			*18.0-148*		*05/02/2019 23:09*	WG1274928

Sample Narrative:

L1093844-09 WG1274928: Diluted due to viscosity

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0756	0.392	10	05/06/2019 18:15	WG1275198
Acenaphthylene	U		0.0790	0.392	10	05/06/2019 18:15	WG1275198
Anthracene	U		0.0744	0.392	10	05/06/2019 18:15	WG1275198
Benzo(a)anthracene	U		0.0504	0.392	10	05/06/2019 18:15	WG1275198
Benzo(b)fluoranthene	U		0.0818	0.392	10	05/06/2019 18:15	WG1275198
Benzo(k)fluoranthene	U		0.0685	0.392	10	05/06/2019 18:15	WG1275198
Benzo(g,h,i)perylene	U		0.0849	0.392	10	05/06/2019 18:15	WG1275198
Benzo(a)pyrene	U		0.0645	0.392	10	05/06/2019 18:15	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0906	3.92	10	05/06/2019 18:15	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.105	3.92	10	05/06/2019 18:15	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0895	3.92	10	05/06/2019 18:15	WG1275198
4-Bromophenyl-phenylether	U		0.134	3.92	10	05/06/2019 18:15	WG1275198
2-Chloronaphthalene	U		0.0752	0.392	10	05/06/2019 18:15	WG1275198
4-Chlorophenyl-phenylether	U		0.0738	3.92	10	05/06/2019 18:15	WG1275198
Chrysene	U		0.0653	0.392	10	05/06/2019 18:15	WG1275198
Dibenz(a,h)anthracene	U		0.0966	0.392	10	05/06/2019 18:15	WG1275198
3,3-Dichlorobenzidine	U		0.935	3.92	10	05/06/2019 18:15	WG1275198
2,4-Dinitrotoluene	U		0.0714	3.92	10	05/06/2019 18:15	WG1275198
2,6-Dinitrotoluene	U		0.0867	3.92	10	05/06/2019 18:15	WG1275198
Fluoranthene	U		0.0584	0.392	10	05/06/2019 18:15	WG1275198
Fluorene	U		0.0803	0.392	10	05/06/2019 18:15	WG1275198
Hexachlorobenzene	U		0.101	3.92	10	05/06/2019 18:15	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.118	3.92	10	05/06/2019 18:15	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Hexachlorocyclopentadiene	U	J0 J3	0.691	3.92	10	05/06/2019 18:15	WG1275198
Hexachloroethane	U	J3	0.158	3.92	10	05/06/2019 18:15	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0909	0.392	10	05/06/2019 18:15	WG1275198
Isophorone	U		0.0614	3.92	10	05/06/2019 18:15	WG1275198
Naphthalene	U	J3	0.105	0.392	10	05/06/2019 18:15	WG1275198
Nitrobenzene	U	J3	0.0818	3.92	10	05/06/2019 18:15	WG1275198
n-Nitrosodimethylamine	U		0.762	3.92	10	05/06/2019 18:15	WG1275198
n-Nitrosodiphenylamine	U		1.06	3.92	10	05/06/2019 18:15	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.107	3.92	10	05/06/2019 18:15	WG1275198
Phenanthrene	U		0.0621	0.392	10	05/06/2019 18:15	WG1275198
Pyridine	U	J3	0.739	3.92	10	05/06/2019 18:15	WG1275198
Benzylbutyl phthalate	U		0.121	3.92	10	05/06/2019 18:15	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.141	3.92	10	05/06/2019 18:15	WG1275198
Di-n-butyl phthalate	U		0.128	3.92	10	05/06/2019 18:15	WG1275198
Diethyl phthalate	U		0.0813	3.92	10	05/06/2019 18:15	WG1275198
Dimethyl phthalate	U		0.0636	3.92	10	05/06/2019 18:15	WG1275198
Di-n-octyl phthalate	U		0.107	3.92	10	05/06/2019 18:15	WG1275198
Pyrene	U		0.145	0.392	10	05/06/2019 18:15	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.103	3.92	10	05/06/2019 18:15	WG1275198
4-Chloro-3-methylphenol	U		0.0561	3.92	10	05/06/2019 18:15	WG1275198
2-Chlorophenol	U	J3	0.0978	3.92	10	05/06/2019 18:15	WG1275198
2,4-Dichlorophenol	U		0.0878	3.92	10	05/06/2019 18:15	WG1275198
2,4-Dimethylphenol	U	J0	0.554	3.92	10	05/06/2019 18:15	WG1275198
4,6-Dinitro-2-methylphenol	U		1.46	3.92	10	05/06/2019 18:15	WG1275198
2,4-Dinitrophenol	U	J3	1.15	3.92	10	05/06/2019 18:15	WG1275198
2-Methylphenol	U	J3	0.116	3.92	10	05/06/2019 18:15	WG1275198
3&4-Methyl Phenol	U		0.0922	3.92	10	05/06/2019 18:15	WG1275198
2-Nitrophenol	U	J3	0.153	3.92	10	05/06/2019 18:15	WG1275198
4-Nitrophenol	U		0.618	3.92	10	05/06/2019 18:15	WG1275198
Pentachlorophenol	U		0.565	3.92	10	05/06/2019 18:15	WG1275198
Phenol	U		0.0818	3.92	10	05/06/2019 18:15	WG1275198
2,4,6-Trichlorophenol	U		0.0917	3.92	10	05/06/2019 18:15	WG1275198
2,4,5-Trichlorophenol	U		0.122	3.92	10	05/06/2019 18:15	WG1275198
(S) 2-Fluorophenol	*49.1*			*12.0-120*		*05/06/2019 18:15*	WG1275198
(S) Phenol-d5	*49.2*			*10.0-120*		*05/06/2019 18:15*	WG1275198
(S) Nitrobenzene-d5	*37.1*			*10.0-122*		*05/06/2019 18:15*	WG1275198
(S) 2-Fluorobiphenyl	*38.9*			*15.0-120*		*05/06/2019 18:15*	WG1275198
(S) 2,4,6-Tribromophenol	*54.5*			*10.0-127*		*05/06/2019 18:15*	WG1275198
(S) p-Terphenyl-d14	*53.9*			*10.0-120*		*05/06/2019 18:15*	WG1275198

Sample Narrative:

L1093844-09 WG1275198: Dilution due to matrix impact during extract concentration procedure

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)anthracene	0.0120		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Benzo(a)pyrene	0.0184		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Benzo(b)fluoranthene	0.0232		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Benzo(k)fluoranthene	0.00824		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Chrysene	0.0228		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Dibenz(a,h)anthracene	0.00297	J	0.000706	0.00706	1	05/07/2019 13:02	WG1276612
Indeno(1,2,3-cd)pyrene	0.0112		0.000706	0.00706	1	05/07/2019 13:02	WG1276612
(S) Nitrobenzene-d5	*91.7*			*14.0-149*		*05/07/2019 13:02*	WG1276612
(S) 2-Fluorobiphenyl	*83.0*			*34.0-125*		*05/07/2019 13:02*	WG1276612
(S) p-Terphenyl-d14	*89.8*			*23.0-120*		*05/07/2019 13:02*	WG1276612

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.3		1	05/03/2019 14:10	WG1275563

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	U		0.0153	0.0280	1	05/01/2019 14:36	WG1274486
Acrylonitrile	U		0.00213	0.0140	1	05/01/2019 14:36	WG1274486
Benzene	U		0.000448	0.00112	1	05/01/2019 14:36	WG1274486
Bromobenzene	U		0.00118	0.0140	1	05/01/2019 14:36	WG1274486
Bromodichloromethane	U		0.000883	0.00280	1	05/01/2019 14:36	WG1274486
Bromoform	U		0.00670	0.0280	1	05/01/2019 14:36	WG1274486
Bromomethane	U		0.00414	0.0140	1	05/01/2019 14:36	WG1274486
n-Butylbenzene	U		0.00430	0.0140	1	05/01/2019 14:36	WG1274486
sec-Butylbenzene	U		0.00283	0.0140	1	05/01/2019 14:36	WG1274486
tert-Butylbenzene	U		0.00174	0.00560	1	05/01/2019 14:36	WG1274486
Carbon tetrachloride	U		0.00121	0.00560	1	05/01/2019 14:36	WG1274486
Chlorobenzene	U		0.000642	0.00280	1	05/01/2019 14:36	WG1274486
Chlorodibromomethane	U		0.000504	0.00280	1	05/01/2019 14:36	WG1274486
Chloroethane	U		0.00121	0.00560	1	05/01/2019 14:36	WG1274486
Chloroform	U		0.000465	0.00280	1	05/01/2019 14:36	WG1274486
Chloromethane	U		0.00156	0.0140	1	05/01/2019 14:36	WG1274486
2-Chlorotoluene	U		0.00103	0.00280	1	05/01/2019 14:36	WG1274486
4-Chlorotoluene	U		0.00127	0.00560	1	05/01/2019 14:36	WG1274486
1,2-Dibromo-3-Chloropropane	U	J0	0.00571	0.0280	1	05/01/2019 14:36	WG1274486
1,2-Dibromoethane	U		0.000588	0.00280	1	05/01/2019 14:36	WG1274486
Dibromomethane	U		0.00112	0.00560	1	05/01/2019 14:36	WG1274486
1,2-Dichlorobenzene	U		0.00162	0.00560	1	05/01/2019 14:36	WG1274486
1,3-Dichlorobenzene	U		0.00190	0.00560	1	05/01/2019 14:36	WG1274486
1,4-Dichlorobenzene	U		0.00221	0.00560	1	05/01/2019 14:36	WG1274486
Dichlorodifluoromethane	U	J4	0.000916	0.00280	1	05/01/2019 14:36	WG1274486
1,1-Dichloroethane	U		0.000644	0.00280	1	05/01/2019 14:36	WG1274486
1,2-Dichloroethane	U		0.000532	0.00280	1	05/01/2019 14:36	WG1274486
1,1-Dichloroethene	U		0.000560	0.00280	1	05/01/2019 14:36	WG1274486
cis-1,2-Dichloroethene	U		0.000773	0.00280	1	05/01/2019 14:36	WG1274486
trans-1,2-Dichloroethene	U		0.00160	0.00560	1	05/01/2019 14:36	WG1274486
1,2-Dichloropropane	U		0.00142	0.00560	1	05/01/2019 14:36	WG1274486
1,1-Dichloropropene	U		0.000784	0.00280	1	05/01/2019 14:36	WG1274486
1,3-Dichloropropane	U		0.00196	0.00560	1	05/01/2019 14:36	WG1274486
cis-1,3-Dichloropropene	U		0.000759	0.00280	1	05/01/2019 14:36	WG1274486
trans-1,3-Dichloropropene	U		0.00171	0.00560	1	05/01/2019 14:36	WG1274486
2,2-Dichloropropane	U		0.000888	0.00280	1	05/01/2019 14:36	WG1274486
Di-isopropyl ether	U		0.000392	0.00112	1	05/01/2019 14:36	WG1274486
Ethylbenzene	U		0.000594	0.00280	1	05/01/2019 14:36	WG1274486
Hexachloro-1,3-butadiene	U	J0	0.0142	0.0280	1	05/01/2019 14:36	WG1274486
Isopropylbenzene	U		0.000967	0.00280	1	05/01/2019 14:36	WG1274486
p-Isopropyltoluene	U		0.00261	0.00560	1	05/01/2019 14:36	WG1274486
2-Butanone (MEK)	U		0.0140	0.0280	1	05/01/2019 14:36	WG1274486
Methylene Chloride	U		0.00744	0.0280	1	05/01/2019 14:36	WG1274486
4-Methyl-2-pentanone (MIBK)	U		0.0112	0.0280	1	05/01/2019 14:36	WG1274486
Methyl tert-butyl ether	U		0.000330	0.00112	1	05/01/2019 14:36	WG1274486
Naphthalene	U		0.00350	0.0140	1	05/01/2019 14:36	WG1274486
n-Propylbenzene	U		0.00132	0.00560	1	05/01/2019 14:36	WG1274486
Styrene	U		0.00306	0.0140	1	05/01/2019 14:36	WG1274486
1,1,1,2-Tetrachloroethane	U		0.000560	0.00280	1	05/01/2019 14:36	WG1274486
1,1,2,2-Tetrachloroethane	U		0.000437	0.00280	1	05/01/2019 14:36	WG1274486

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.000756	0.00280	1	05/01/2019 14:36	WG1274486
Tetrachloroethene	U		0.000784	0.00280	1	05/01/2019 14:36	WG1274486
Toluene	U		0.00140	0.00560	1	05/01/2019 14:36	WG1274486
1,2,3-Trichlorobenzene	U	J0	0.000700	0.00280	1	05/01/2019 14:36	WG1274486
1,2,4-Trichlorobenzene	U	J0	0.00540	0.0140	1	05/01/2019 14:36	WG1274486
1,1,1-Trichloroethane	U		0.000308	0.00280	1	05/01/2019 14:36	WG1274486
1,1,2-Trichloroethane	U		0.000989	0.00280	1	05/01/2019 14:36	WG1274486
Trichloroethene	U		0.000448	0.00112	1	05/01/2019 14:36	WG1274486
Trichlorofluoromethane	U		0.000560	0.00280	1	05/01/2019 14:36	WG1274486
1,2,3-Trichloropropane	U		0.00571	0.0140	1	05/01/2019 14:36	WG1274486
1,2,4-Trimethylbenzene	U		0.00130	0.00560	1	05/01/2019 14:36	WG1274486
1,2,3-Trimethylbenzene	U		0.00129	0.00560	1	05/01/2019 14:36	WG1274486
Vinyl chloride	U		0.000765	0.00280	1	05/01/2019 14:36	WG1274486
1,3,5-Trimethylbenzene	U		0.00121	0.00560	1	05/01/2019 14:36	WG1274486
Xylenes, Total	U		0.00535	0.00728	1	05/01/2019 14:36	WG1274486
(S) Toluene-d8	*107*			*75.0-131*		*05/01/2019 14:36*	WG1274486
(S) 4-Bromofluorobenzene	*92.3*			*67.0-138*		*05/01/2019 14:36*	WG1274486
(S) 1,2-Dichloroethane-d4	*102*			*70.0-130*		*05/01/2019 14:36*	WG1274486

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	2.40	J	1.49	4.48	1	05/02/2019 22:04	WG1274928
Residual Range Organics (RRO)	13.1		3.73	11.2	1	05/02/2019 22:04	WG1274928
(S) o-Terphenyl	*109*			*18.0-148*		*05/02/2019 22:04*	WG1274928

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.0719	0.373	10	05/06/2019 17:56	WG1275198
Acenaphthylene	U		0.0752	0.373	10	05/06/2019 17:56	WG1275198
Anthracene	U		0.0708	0.373	10	05/06/2019 17:56	WG1275198
Benzo(a)anthracene	U		0.0479	0.373	10	05/06/2019 17:56	WG1275198
Benzo(b)fluoranthene	U		0.0779	0.373	10	05/06/2019 17:56	WG1275198
Benzo(k)fluoranthene	U		0.0652	0.373	10	05/06/2019 17:56	WG1275198
Benzo(g,h,i)perylene	U		0.0808	0.373	10	05/06/2019 17:56	WG1275198
Benzo(a)pyrene	U		0.0614	0.373	10	05/06/2019 17:56	WG1275198
Bis(2-chlorethoxy)methane	U	J3	0.0863	3.73	10	05/06/2019 17:56	WG1275198
Bis(2-chloroethyl)ether	U	J3	0.100	3.73	10	05/06/2019 17:56	WG1275198
Bis(2-chloroisopropyl)ether	U	J3	0.0851	3.73	10	05/06/2019 17:56	WG1275198
4-Bromophenyl-phenylether	U		0.128	3.73	10	05/06/2019 17:56	WG1275198
2-Chloronaphthalene	U		0.0716	0.373	10	05/06/2019 17:56	WG1275198
4-Chlorophenyl-phenylether	U		0.0702	3.73	10	05/06/2019 17:56	WG1275198
Chrysene	U		0.0622	0.373	10	05/06/2019 17:56	WG1275198
Dibenz(a,h)anthracene	U		0.0920	0.373	10	05/06/2019 17:56	WG1275198
3,3-Dichlorobenzidine	U		0.889	3.73	10	05/06/2019 17:56	WG1275198
2,4-Dinitrotoluene	U		0.0680	3.73	10	05/06/2019 17:56	WG1275198
2,6-Dinitrotoluene	U		0.0826	3.73	10	05/06/2019 17:56	WG1275198
Fluoranthene	U		0.0556	0.373	10	05/06/2019 17:56	WG1275198
Fluorene	U		0.0764	0.373	10	05/06/2019 17:56	WG1275198
Hexachlorobenzene	U		0.0959	3.73	10	05/06/2019 17:56	WG1275198
Hexachloro-1,3-butadiene	U	J3	0.112	3.73	10	05/06/2019 17:56	WG1275198
Hexachlorocyclopentadiene	U	J0 J3	0.658	3.73	10	05/06/2019 17:56	WG1275198
Hexachloroethane	U	J3	0.150	3.73	10	05/06/2019 17:56	WG1275198
Indeno(1,2,3-cd)pyrene	U		0.0865	0.373	10	05/06/2019 17:56	WG1275198

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Isophorone	U		0.0585	3.73	10	05/06/2019 17:56	WG1275198
Naphthalene	U	J3	0.0996	0.373	10	05/06/2019 17:56	WG1275198
Nitrobenzene	U	J3	0.0779	3.73	10	05/06/2019 17:56	WG1275198
n-Nitrosodimethylamine	U		0.725	3.73	10	05/06/2019 17:56	WG1275198
n-Nitrosodiphenylamine	U		1.01	3.73	10	05/06/2019 17:56	WG1275198
n-Nitrosodi-n-propylamine	U	J3	0.101	3.73	10	05/06/2019 17:56	WG1275198
Phenanthrene	U		0.0591	0.373	10	05/06/2019 17:56	WG1275198
Pyridine	U	J3	0.703	3.73	10	05/06/2019 17:56	WG1275198
Benzylbutyl phthalate	U		0.115	3.73	10	05/06/2019 17:56	WG1275198
Bis(2-ethylhexyl)phthalate	U		0.134	3.73	10	05/06/2019 17:56	WG1275198
Di-n-butyl phthalate	U		0.122	3.73	10	05/06/2019 17:56	WG1275198
Diethyl phthalate	U		0.0774	3.73	10	05/06/2019 17:56	WG1275198
Dimethyl phthalate	U		0.0605	3.73	10	05/06/2019 17:56	WG1275198
Di-n-octyl phthalate	U		0.102	3.73	10	05/06/2019 17:56	WG1275198
Pyrene	U		0.138	0.373	10	05/06/2019 17:56	WG1275198
1,2,4-Trichlorobenzene	U	J3	0.0981	3.73	10	05/06/2019 17:56	WG1275198
4-Chloro-3-methylphenol	U		0.0534	3.73	10	05/06/2019 17:56	WG1275198
2-Chlorophenol	U	J3	0.0931	3.73	10	05/06/2019 17:56	WG1275198
2,4-Dichlorophenol	U		0.0836	3.73	10	05/06/2019 17:56	WG1275198
2,4-Dimethylphenol	U	J0	0.528	3.73	10	05/06/2019 17:56	WG1275198
4,6-Dinitro-2-methylphenol	U		1.39	3.73	10	05/06/2019 17:56	WG1275198
2,4-Dinitrophenol	U	J3	1.10	3.73	10	05/06/2019 17:56	WG1275198
2-Methylphenol	U	J3	0.110	3.73	10	05/06/2019 17:56	WG1275198
3&4-Methyl Phenol	U		0.0877	3.73	10	05/06/2019 17:56	WG1275198
2-Nitrophenol	U	J3	0.146	3.73	10	05/06/2019 17:56	WG1275198
4-Nitrophenol	U		0.588	3.73	10	05/06/2019 17:56	WG1275198
Pentachlorophenol	U		0.538	3.73	10	05/06/2019 17:56	WG1275198
Phenol	U		0.0779	3.73	10	05/06/2019 17:56	WG1275198
2,4,6-Trichlorophenol	U		0.0873	3.73	10	05/06/2019 17:56	WG1275198
2,4,5-Trichlorophenol	U		0.117	3.73	10	05/06/2019 17:56	WG1275198
(S) 2-Fluorophenol	*73.8*			*12.0-120*		*05/06/2019 17:56*	WG1275198
(S) Phenol-d5	*71.0*			*10.0-120*		*05/06/2019 17:56*	WG1275198
(S) Nitrobenzene-d5	*59.6*			*10.0-122*		*05/06/2019 17:56*	WG1275198
(S) 2-Fluorobiphenyl	*53.4*			*15.0-120*		*05/06/2019 17:56*	WG1275198
(S) 2,4,6-Tribromophenol	*85.4*			*10.0-127*		*05/06/2019 17:56*	WG1275198
(S) p-Terphenyl-d14	*88.2*			*10.0-120*		*05/06/2019 17:56*	WG1275198

Sample Narrative:

L1093844-10 WG1275198: Dilution due to matrix impact during extract concentration procedure

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.000989	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Benzo(a)pyrene	0.00257	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Benzo(b)fluoranthene	0.00441	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Benzo(k)fluoranthene	0.00151	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Chrysene	0.00120	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Dibenz(a,h)anthracene	U		0.000672	0.00672	1	05/07/2019 13:23	WG1276612
Indeno(1,2,3-cd)pyrene	0.00204	J	0.000672	0.00672	1	05/07/2019 13:23	WG1276612
(S) Nitrobenzene-d5	*117*			*14.0-149*		*05/07/2019 13:23*	WG1276612
(S) 2-Fluorobiphenyl	*86.7*			*34.0-125*		*05/07/2019 13:23*	WG1276612
(S) p-Terphenyl-d14	*105*			*23.0-120*		*05/07/2019 13:23*	WG1276612

Method Blank (MB)

(MB) R3408164-1 05/03/19 14:31

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.00100			

L1093844-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1093844-04 05/03/19 14:31 • (DUP) R3408164-3 05/03/19 14:31

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	88.0	87.8	1	0.166		10

Laboratory Control Sample (LCS)

(LCS) R3408164-2 05/03/19 14:31

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3408163-1 05/03/19 14:10

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	%		%	%
Total Solids	0.000			

L1093848-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1093848-01 05/03/19 14:10 • (DUP) R3408163-3 05/03/19 14:10

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	%	%		%		%
Total Solids	95.3	96.4	1	1.14		10

Laboratory Control Sample (LCS)

(LCS) R3408163-2 05/03/19 14:10

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3407247-2 05/01/19 11:33

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0137	0.0250
Acrylonitrile	U		0.00190	0.0125
Benzene	U		0.000400	0.00100
Bromobenzene	U		0.00105	0.0125
Bromodichloromethane	U		0.000788	0.00250
Bromoform	U		0.00598	0.0250
Bromomethane	U		0.00370	0.0125
n-Butylbenzene	U		0.00384	0.0125
sec-Butylbenzene	U		0.00253	0.0125
tert-Butylbenzene	U		0.00155	0.00500
Carbon tetrachloride	U		0.00108	0.00500
Chlorobenzene	U		0.000573	0.00250
Chlorodibromomethane	U		0.000450	0.00250
Chloroethane	U		0.00108	0.00500
Chloroform	U		0.000415	0.00250
Chloromethane	U		0.00139	0.0125
2-Chlorotoluene	U		0.000920	0.00250
4-Chlorotoluene	U		0.00113	0.00500
1,2-Dibromo-3-Chloropropane	U		0.00510	0.0250
1,2-Dibromoethane	U		0.000525	0.00250
Dibromomethane	U		0.00100	0.00500
1,2-Dichlorobenzene	U		0.00145	0.00500
1,3-Dichlorobenzene	U		0.00170	0.00500
1,4-Dichlorobenzene	U		0.00197	0.00500
Dichlorodifluoromethane	U		0.000818	0.00250
1,1-Dichloroethane	U		0.000575	0.00250
1,2-Dichloroethane	U		0.000475	0.00250
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
1,2-Dichloropropane	U		0.00127	0.00500
1,1-Dichloropropene	U		0.000700	0.00250
1,3-Dichloropropane	U		0.00175	0.00500
cis-1,3-Dichloropropene	U		0.000678	0.00250
trans-1,3-Dichloropropene	U		0.00153	0.00500
2,2-Dichloropropane	U		0.000793	0.00250
Di-isopropyl ether	U		0.000350	0.00100
Ethylbenzene	U		0.000530	0.00250
Hexachloro-1,3-butadiene	U		0.0127	0.0250
Isopropylbenzene	U		0.000863	0.00250

Method Blank (MB)

(MB) R3407247-2 05/01/19 11:33

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
p-Isopropyltoluene	U		0.00233	0.00500
2-Butanone (MEK)	U		0.0125	0.0250
Methylene Chloride	U		0.00664	0.0250
4-Methyl-2-pentanone (MIBK)	U		0.0100	0.0250
Methyl tert-butyl ether	U		0.000295	0.00100
Naphthalene	U		0.00312	0.0125
n-Propylbenzene	U		0.00118	0.00500
Styrene	U		0.00273	0.0125
1,1,1,2-Tetrachloroethane	U		0.000500	0.00250
1,1,2,2-Tetrachloroethane	U		0.000390	0.00250
Tetrachloroethene	U		0.000700	0.00250
Toluene	U		0.00125	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000675	0.00250
1,2,3-Trichlorobenzene	U		0.000625	0.00250
1,2,4-Trichlorobenzene	U		0.00482	0.0125
1,1,1-Trichloroethane	U		0.000275	0.00250
1,1,2-Trichloroethane	U		0.000883	0.00250
Trichloroethene	U		0.000400	0.00100
Trichlorofluoromethane	U		0.000500	0.00250
1,2,3-Trichloropropane	U		0.00510	0.0125
1,2,3-Trimethylbenzene	U		0.00115	0.00500
1,2,4-Trimethylbenzene	U		0.00116	0.00500
1,3,5-Trimethylbenzene	U		0.00108	0.00500
Vinyl chloride	U		0.000683	0.00250
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	*109*			*75.0-131*
(S) 4-Bromofluorobenzene	*90.7*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*97.0*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3407247-1 05/01/19 10:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.625	0.571	91.4	10.0-160	
Acrylonitrile	0.625	0.782	125	45.0-153	
Benzene	0.125	0.119	95.4	70.0-123	
Bromobenzene	0.125	0.114	91.0	73.0-121	
Bromodichloromethane	0.125	0.130	104	73.0-121	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Laboratory Control Sample (LCS)

(LCS) R3407247-1 05/01/19 10:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromoform	0.125	0.123	98.8	64.0-132	
Bromomethane	0.125	0.152	121	56.0-147	
n-Butylbenzene	0.125	0.111	89.2	68.0-135	
sec-Butylbenzene	0.125	0.114	90.9	74.0-130	
tert-Butylbenzene	0.125	0.102	81.4	75.0-127	
Carbon tetrachloride	0.125	0.135	108	66.0-128	
Chlorobenzene	0.125	0.126	100	76.0-128	
Chlorodibromomethane	0.125	0.121	96.9	74.0-127	
Chloroethane	0.125	0.132	105	61.0-134	
Chloroform	0.125	0.120	96.2	72.0-123	
Chloromethane	0.125	0.148	119	51.0-138	
2-Chlorotoluene	0.125	0.116	92.8	75.0-124	
4-Chlorotoluene	0.125	0.127	102	75.0-124	
1,2-Dibromo-3-Chloropropane	0.125	0.0973	77.9	59.0-130	
1,2-Dibromoethane	0.125	0.118	94.8	74.0-128	
Dibromomethane	0.125	0.124	99.0	75.0-122	
1,2-Dichlorobenzene	0.125	0.128	103	76.0-124	
1,3-Dichlorobenzene	0.125	0.122	98.0	76.0-125	
1,4-Dichlorobenzene	0.125	0.124	99.0	77.0-121	
Dichlorodifluoromethane	0.125	0.204	164	43.0-156	J4
1,1-Dichloroethane	0.125	0.114	91.5	70.0-127	
1,2-Dichloroethane	0.125	0.122	97.3	65.0-131	
1,1-Dichloroethene	0.125	0.129	104	65.0-131	
cis-1,2-Dichloroethene	0.125	0.120	96.3	73.0-125	
trans-1,2-Dichloroethene	0.125	0.125	99.8	71.0-125	
1,2-Dichloropropane	0.125	0.120	95.6	74.0-125	
1,1-Dichloropropene	0.125	0.119	94.9	73.0-125	
1,3-Dichloropropane	0.125	0.121	96.5	80.0-125	
cis-1,3-Dichloropropene	0.125	0.115	91.9	76.0-127	
trans-1,3-Dichloropropene	0.125	0.127	101	73.0-127	
2,2-Dichloropropane	0.125	0.139	111	59.0-135	
Di-isopropyl ether	0.125	0.110	87.7	60.0-136	
Ethylbenzene	0.125	0.117	93.9	74.0-126	
Hexachloro-1,3-butadiene	0.125	0.109	87.2	57.0-150	
Isopropylbenzene	0.125	0.120	96.0	72.0-127	
p-Isopropyltoluene	0.125	0.114	91.6	72.0-133	
2-Butanone (MEK)	0.625	0.572	91.6	30.0-160	
Methylene Chloride	0.125	0.113	90.1	68.0-123	
4-Methyl-2-pentanone (MIBK)	0.625	0.695	111	56.0-143	
Methyl tert-butyl ether	0.125	0.0876	70.1	66.0-132	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Laboratory Control Sample (LCS)

(LCS) R3407247-1 05/01/19 10:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Naphthalene	0.125	0.0842	67.3	59.0-130	
n-Propylbenzene	0.125	0.115	92.1	74.0-126	
Styrene	0.125	0.0977	78.2	72.0-127	
1,1,1,2-Tetrachloroethane	0.125	0.121	96.7	74.0-129	
1,1,2,2-Tetrachloroethane	0.125	0.120	96.0	68.0-128	
Tetrachloroethene	0.125	0.131	105	70.0-136	
Toluene	0.125	0.127	102	75.0-121	
1,1,2-Trichlorotrifluoroethane	0.125	0.139	111	61.0-139	
1,2,3-Trichlorobenzene	0.125	0.0900	72.0	59.0-139	
1,2,4-Trichlorobenzene	0.125	0.0956	76.4	62.0-137	
1,1,1-Trichloroethane	0.125	0.122	97.2	69.0-126	
1,1,2-Trichloroethane	0.125	0.123	98.8	78.0-123	
Trichloroethene	0.125	0.118	94.6	76.0-126	
Trichlorofluoromethane	0.125	0.131	105	61.0-142	
1,2,3-Trichloropropane	0.125	0.114	90.9	67.0-129	
1,2,3-Trimethylbenzene	0.125	0.123	98.5	74.0-124	
1,2,4-Trimethylbenzene	0.125	0.116	92.6	70.0-126	
1,3,5-Trimethylbenzene	0.125	0.124	99.1	73.0-127	
Vinyl chloride	0.125	0.152	122	63.0-134	
Xylenes, Total	0.375	0.377	101	72.0-127	
(S) Toluene-d8			*105*	*75.0-131*	
(S) 4-Bromofluorobenzene			*105*	*67.0-138*	
(S) 1,2-Dichloroethane-d4			*103*	*70.0-130*	

Method Blank (MB)

(MB) R3408281-2 05/02/19 13:20

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Naphthalene	U		0.00312	0.0125
(S) Toluene-d8	*108*			*75.0-131*
(S) 4-Bromofluorobenzene	*92.8*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*97.4*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3408281-1 05/02/19 11:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Naphthalene	0.125	0.128	103	59.0-130	
(S) Toluene-d8			*104*	*75.0-131*	
(S) 4-Bromofluorobenzene			*106*	*67.0-138*	
(S) 1,2-Dichloroethane-d4			*98.8*	*70.0-130*	

Method Blank (MB)

(MB) R3407728-1 05/02/19 15:02

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*98.5*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407728-2 05/02/19 15:15 • (LCSD) R3407728-3 05/02/19 15:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	25.0	22.4	23.0	89.6	92.0	50.0-150			2.64	20
Residual Range Organics (RRO)	25.0	20.4	21.4	81.6	85.6	50.0-150			4.78	20
(S) o-Terphenyl				*78.8*	*76.3*	*18.0-148*				

Method Blank (MB)

(MB) R3408627-3 05/04/19 15:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acenaphthene	U		0.00642	0.0333
Acenaphthylene	U		0.00671	0.0333
Anthracene	U		0.00632	0.0333
Benzo(a)anthracene	U		0.00428	0.0333
Benzo(b)fluoranthene	U		0.00695	0.0333
Benzo(k)fluoranthene	U		0.00582	0.0333
Benzo(g,h,i)perylene	U		0.00721	0.0333
Benzo(a)pyrene	U		0.00548	0.0333
Bis(2-chlorethoxy)methane	U		0.00770	0.333
Bis(2-chloroethyl)ether	U		0.00896	0.333
Bis(2-chloroisopropyl)ether	U		0.00760	0.333
4-Bromophenyl-phenylether	U		0.0114	0.333
2-Chloronaphthalene	U		0.00639	0.0333
4-Chlorophenyl-phenylether	U		0.00627	0.333
Chrysene	U		0.00555	0.0333
Dibenz(a,h)anthracene	U		0.00821	0.0333
3,3-Dichlorobenzidine	U		0.0794	0.333
2,4-Dinitrotoluene	U		0.00607	0.333
2,6-Dinitrotoluene	U		0.00737	0.333
Fluoranthene	U		0.00496	0.0333
Fluorene	U		0.00682	0.0333
Hexachlorobenzene	U		0.00856	0.333
Hexachloro-1,3-butadiene	U		0.0100	0.333
Hexachlorocyclopentadiene	U		0.0587	0.333
Hexachloroethane	U		0.0134	0.333
Indeno(1,2,3-cd)pyrene	U		0.00772	0.0333
Isophorone	U		0.00522	0.333
Naphthalene	U		0.00889	0.0333
Nitrobenzene	U		0.00695	0.333
n-Nitrosodimethylamine	U		0.0647	0.333
n-Nitrosodiphenylamine	U		0.0900	0.333
n-Nitrosodi-n-propylamine	U		0.00906	0.333
Phenanthrene	U		0.00528	0.0333
Benzylbutyl phthalate	U		0.0103	0.333
Bis(2-ethylhexyl)phthalate	U		0.0120	0.333
Di-n-butyl phthalate	U		0.0109	0.333
Diethyl phthalate	U		0.00691	0.333
Dimethyl phthalate	U		0.00540	0.333
Di-n-octyl phthalate	U		0.00907	0.333
Pyrene	U		0.0123	0.0333

Method Blank (MB)

(MB) R3408627-3 05/04/19 15:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Pyridine	U		0.0628	0.333
1,2,4-Trichlorobenzene	U		0.00876	0.333
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2-Methylphenol	U		0.00986	0.333
3&4-Methyl Phenol	U		0.00783	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,5-Trichlorophenol	U		0.0104	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	*21.7*			*10.0-122*
(S) 2-Fluorobiphenyl	*24.3*			*15.0-120*
(S) p-Terphenyl-d14	*35.1*			*10.0-120*
(S) Phenol-d5	*22.8*			*10.0-120*
(S) 2-Fluorophenol	*24.5*			*12.0-120*
(S) 2,4,6-Tribromophenol	*26.6*			*10.0-127*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408627-1 05/04/19 14:52 • (LCSD) R3408627-2 05/04/19 15:11

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	0.666	0.318	0.335	47.7	50.3	38.0-120			5.21	22
Acenaphthylene	0.666	0.336	0.366	50.5	55.0	40.0-120			8.55	22
Anthracene	0.666	0.378	0.377	56.8	56.6	42.0-120			0.265	20
Benzo(a)anthracene	0.666	0.477	0.463	71.6	69.5	44.0-120			2.98	20
Benzo(b)fluoranthene	0.666	0.455	0.436	68.3	65.5	43.0-120			4.26	22
Benzo(k)fluoranthene	0.666	0.437	0.440	65.6	66.1	44.0-120			0.684	21
Benzo(g,h,i)perylene	0.666	0.436	0.422	65.5	63.4	43.0-120			3.26	22
Benzo(a)pyrene	0.666	0.447	0.428	67.1	64.3	45.0-120			4.34	20
Bis(2-chlorethoxy)methane	0.666	0.198	0.265	29.7	39.8	20.0-120		J3	28.9	23
Bis(2-chloroethyl)ether	0.666	0.195	0.289	29.3	43.4	16.0-120		J3	38.8	31
Bis(2-chloroisopropyl)ether	0.666	0.178	0.258	26.7	38.7	23.0-120		J3	36.7	30

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408627-1 05/04/19 14:52 • (LCSD) R3408627-2 05/04/19 15:11

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Bromophenyl-phenylether	0.666	0.394	0.388	59.2	58.3	40.0-120			1.53	21
2-Chloronaphthalene	0.666	0.270	0.315	40.5	47.3	35.0-120			15.4	24
4-Chlorophenyl-phenylether	0.666	0.410	0.394	61.6	59.2	40.0-120			3.98	22
Chrysene	0.666	0.428	0.406	64.3	61.0	43.0-120			5.28	20
Dibenz(a,h)anthracene	0.666	0.441	0.416	66.2	62.5	44.0-120			5.83	22
3,3-Dichlorobenzidine	1.33	0.879	0.821	66.1	61.7	28.0-120			6.82	23
2,4-Dinitrotoluene	0.666	0.425	0.426	63.8	64.0	45.0-120			0.235	21
2,6-Dinitrotoluene	0.666	0.378	0.381	56.8	57.2	42.0-120			0.791	21
Fluoranthene	0.666	0.431	0.420	64.7	63.1	44.0-120			2.59	21
Fluorene	0.666	0.378	0.379	56.8	56.9	41.0-120			0.264	22
Hexachlorobenzene	0.666	0.392	0.395	58.9	59.3	39.0-120			0.762	21
Hexachloro-1,3-butadiene	0.666	0.203	0.292	30.5	43.8	15.0-120		J3	36.0	28
Hexachlorocyclopentadiene	0.666	0.252	0.362	37.8	54.4	15.0-120		J3	35.8	31
Hexachloroethane	0.666	0.170	0.260	25.5	39.0	17.0-120		J3	41.9	31
Indeno(1,2,3-cd)pyrene	0.666	0.447	0.429	67.1	64.4	45.0-120			4.11	21
Isophorone	0.666	0.218	0.271	32.7	40.7	23.0-120			21.7	23
Naphthalene	0.666	0.192	0.259	28.8	38.9	18.0-120		J3	29.7	24
Nitrobenzene	0.666	0.198	0.274	29.7	41.1	17.0-120		J3	32.2	26
n-Nitrosodimethylamine	0.666	0.210	0.291	31.5	43.7	10.0-125			32.3	33
n-Nitrosodiphenylamine	0.666	0.373	0.372	56.0	55.9	40.0-120			0.268	21
n-Nitrosodi-n-propylamine	0.666	0.217	0.287	32.6	43.1	26.0-120		J3	27.8	27
Phenanthrene	0.666	0.377	0.373	56.6	56.0	42.0-120			1.07	20
Benzylbutyl phthalate	0.666	0.456	0.429	68.5	64.4	40.0-120			6.10	21
Bis(2-ethylhexyl)phthalate	0.666	0.449	0.432	67.4	64.9	41.0-120			3.86	21
Di-n-butyl phthalate	0.666	0.424	0.417	63.7	62.6	43.0-120			1.66	20
Diethyl phthalate	0.666	0.424	0.420	63.7	63.1	43.0-120			0.948	21
Dimethyl phthalate	0.666	0.373	0.377	56.0	56.6	43.0-120			1.07	22
Di-n-octyl phthalate	0.666	0.428	0.415	64.3	62.3	40.0-120			3.08	21
Pyrene	0.666	0.443	0.432	66.5	64.9	41.0-120			2.51	21
Pyridine	0.666	0.0905	0.159	13.6	23.9	10.0-120		J3	54.9	35
1,2,4-Trichlorobenzene	0.666	0.199	0.280	29.9	42.0	17.0-120		J3	33.8	26
4-Chloro-3-methylphenol	0.666	0.333	0.344	50.0	51.7	28.0-120			3.25	20
2-Chlorophenol	0.666	0.221	0.302	33.2	45.3	28.0-120		J3	31.0	28
2-Methylphenol	0.666	0.247	0.323	37.1	48.5	35.0-120		J3	26.7	24
3&4-Methyl Phenol	0.666	0.286	0.347	42.9	52.1	42.0-120			19.3	25
2,4-Dichlorophenol	0.666	0.264	0.316	39.6	47.4	25.0-120			17.9	21
2,4-Dimethylphenol	0.666	0.256	0.296	38.4	44.4	15.0-120			14.5	26
4,6-Dinitro-2-methylphenol	0.666	0.457	0.525	68.6	78.8	16.0-120			13.8	33
2,4-Dinitrophenol	0.666	0.214	0.475	32.1	71.3	10.0-120		J3	75.8	40
2-Nitrophenol	0.666	0.235	0.336	35.3	50.5	20.0-120		J3	35.4	25

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408627-1 05/04/19 14:52 • (LCSD) R3408627-2 05/04/19 15:11

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Nitrophenol	0.666	0.443	0.422	66.5	63.4	27.0-120			4.86	24
Pentachlorophenol	0.666	0.468	0.465	70.3	69.8	29.0-120			0.643	25
Phenol	0.666	0.246	0.322	36.9	48.3	28.0-120			26.8	27
2,4,5-Trichlorophenol	0.666	0.438	0.446	65.8	67.0	38.0-120			1.81	24
2,4,6-Trichlorophenol	0.666	0.377	0.398	56.6	59.8	37.0-120			5.42	24
(S) Nitrobenzene-d5				*33.3*	*45.3*	*10.0-122*				
(S) 2-Fluorobiphenyl				*42.9*	*50.8*	*15.0-120*				
(S) p-Terphenyl-d14				*69.1*	*67.6*	*10.0-120*				
(S) Phenol-d5				*36.5*	*46.8*	*10.0-120*				
(S) 2-Fluorophenol				*36.3*	*50.6*	*12.0-120*				
(S) 2,4,6-Tribromophenol				*65.8*	*64.7*	*10.0-127*				

Method Blank (MB)

(MB) R3407838-3 05/03/19 08:16

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
(S) Nitrobenzene-d5	*83.3*			*14.0-149*
(S) 2-Fluorobiphenyl	*79.4*			*34.0-125*
(S) p-Terphenyl-d14	*79.3*			*23.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3407838-1 05/03/19 07:34 • (LCSD) R3407838-2 05/03/19 07:55

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	0.0800	0.0600	0.0599	75.0	74.9	45.0-120			0.167	20
Benzo(a)pyrene	0.0800	0.0538	0.0525	67.3	65.6	42.0-120			2.45	20
Benzo(b)fluoranthene	0.0800	0.0533	0.0539	66.6	67.4	42.0-121			1.12	20
Benzo(k)fluoranthene	0.0800	0.0557	0.0537	69.6	67.1	49.0-125			3.66	20
Chrysene	0.0800	0.0538	0.0541	67.3	67.6	49.0-122			0.556	20
Dibenz(a,h)anthracene	0.0800	0.0565	0.0564	70.6	70.5	47.0-125			0.177	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0573	0.0570	71.6	71.3	46.0-125			0.525	20
(S) Nitrobenzene-d5				*82.5*	*83.6*	*14.0-149*				
(S) 2-Fluorobiphenyl				*76.6*	*77.5*	*34.0-125*				
(S) p-Terphenyl-d14				*78.1*	*78.5*	*23.0-120*				

L1093416-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1093416-01 05/03/19 13:31 • (MS) R3407838-4 05/03/19 13:52 • (MSD) R3407838-5 05/03/19 14:13

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	0.0800	0.100	0.0696	0.0615	0.000	0.000	10	10.0-139	J6	J6	12.4	30
Benzo(a)pyrene	0.0800	0.118	0.0677	0.0607	0.000	0.000	10	10.0-141	J6	J6	10.9	31
Benzo(b)fluoranthene	0.0800	0.159	0.0850	0.0685	0.000	0.000	10	10.0-140	J6	J6	21.5	36
Benzo(k)fluoranthene	0.0800	ND	0.0601	0.0558	15.5	10.1	10	10.0-137			7.42	31
Chrysene	0.0800	0.105	0.0754	0.0667	0.000	0.000	10	10.0-145	J6	J6	12.2	30
Dibenz(a,h)anthracene	0.0800	ND	0.0625	0.0540	50.0	39.4	10	10.0-132			14.6	31
Indeno(1,2,3-cd)pyrene	0.0800	0.0730	0.0678	0.0595	0.000	0.000	10	10.0-137	J6	J6	13.0	32

L1093416-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1093416-01 05/03/19 13:31 • (MS) R3407838-4 05/03/19 13:52 • (MSD) R3407838-5 05/03/19 14:13

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) Nitrobenzene-d5					*84.3*	*126*		*14.0-149*				
(S) 2-Fluorobiphenyl					*122*	*120*		*34.0-125*				
(S) p-Terphenyl-d14					*84.5*	*76.9*		*23.0-120*				

Method Blank (MB)

(MB) R3408716-2 05/07/19 08:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
(S) Nitrobenzene-d5	*111*			*14.0-149*
(S) 2-Fluorobiphenyl	*106*			*34.0-125*
(S) p-Terphenyl-d14	*111*			*23.0-120*

Laboratory Control Sample (LCS)

(LCS) R3408716-1 05/07/19 08:06

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzo(a)anthracene	0.0800	0.0638	79.8	45.0-120	
Benzo(a)pyrene	0.0800	0.0674	84.3	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0628	78.5	42.0-121	
Benzo(k)fluoranthene	0.0800	0.0808	101	49.0-125	
Chrysene	0.0800	0.0739	92.4	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0649	81.1	47.0-125	
Indeno(1,2,3-cd)pyrene	0.0800	0.0653	81.6	46.0-125	
(S) Nitrobenzene-d5			*109*	*14.0-149*	
(S) 2-Fluorobiphenyl			*101*	*34.0-125*	
(S) p-Terphenyl-d14			*104*	*23.0-120*	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J0	J0: The identification of the analyte is acceptable, but the reported concentration is an estimate. The calibration met method criteria.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

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Illinois	200008
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Iowa	364
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Kentucky [2]	16
Louisiana	AI30792
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Michigan	9958
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Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
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South Dakota	n/a
Tennessee [1 4]	2006
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Texas [5]	LAB0152
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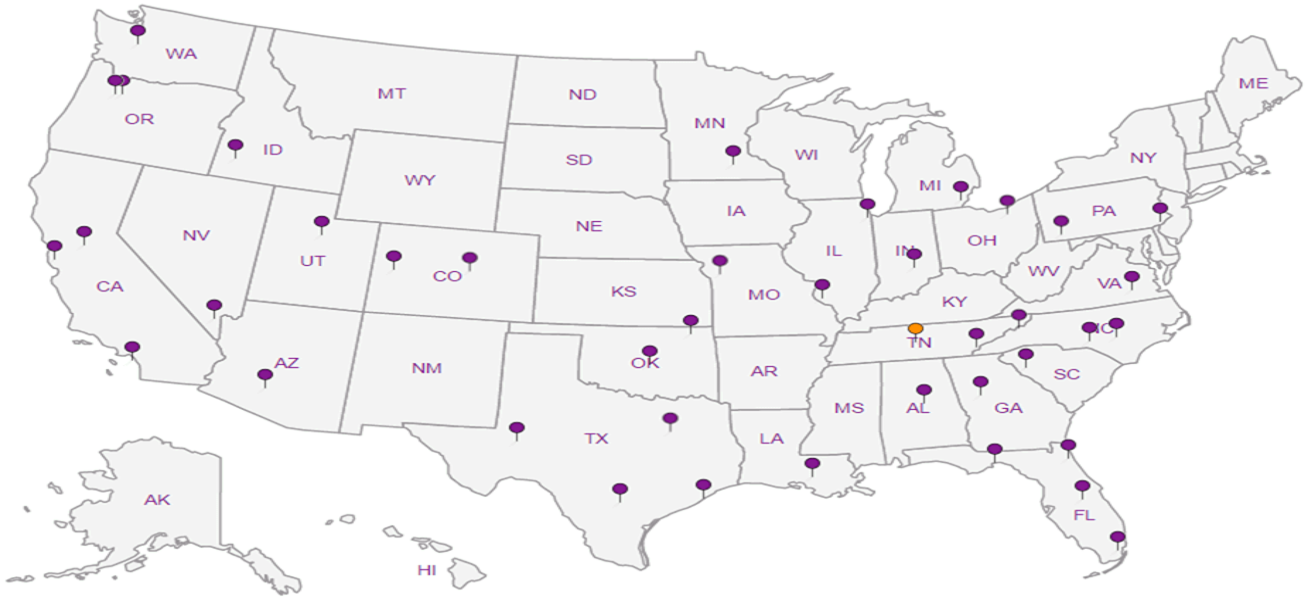
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

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Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.000~~48~~59**

Lab Project # **SLRWLOR-NORDDOOR**

Collected by (print): Steven Loslobar

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature):

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Chain of Custody Page 1 of 1

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National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
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L# L1093844

B037

Acctnum: **SLRWLOR**
Template: **T148769**
Prelogin: **P703216**
TSR: **110 - Brian Ford**
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	NWTPHDX NOSGT 8ozClr-NoPres	SVOCs 8270D 8ozClr-NoPres	VOCs 8260C 40mlAmb/MeOH5ml/Syr	cPAHs SV8270PAHSIMD 8ozClr-NoPres	dry weight 2ozClr-NoPres						Remarks	Sample # (lab only)
GP-MW-11-SS	Comp	SS	0-12'	4/25/19	1510	3		X	X									-01
GP-MW-12-SS	Comp	SS	0-10'	4/25/19	1140	3			X	X								-02
GP-MW-12-SS-18-19	Grab	SS	18-19'	4/25/19	1118	~~3~~ 0											Hold	
GP-MW-13-SS	Comp	SS	0-12'	4/25/19	0940	3		X		X								-04
GP-MW-14-SS	Comp	SS	0-12'	4/25/19	1415	1		X		X								-05
GP-MW-15-SS	Comp	SS	0-12'	4/26/19	1342	2			X									-06
GP-MW-16-SS	Comp	SS	0-12'	4/26/19	1315	2	X	X		X								-07
GP-MW-17-SS	Comp	SS	0-12'	4/26/19	1450	3	X	X	X	X								-08
GP-801-SS	Comp	SS	0-12'	4/26/19	0845	3	X	X	X	X								-09
GP-802-SS	Comp	SS	0-12'	4/26/19	1615	3	X	X	X	X								-10

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS ✓ FedEx __ Courier ______

Tracking # 4686 6470 0200

Sample Receipt Checklist ✓
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: ✓Y __N

Relinquished by : (Signature)	Date: 4/29/19	Time: 1400	Received by: (Signature)	Trip Blank Received: [✓ Yes] / No [✓ HCL] / MeoH TBR 1
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.6±0=0.6 °C Bottles Received: 23
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4/30/19 Time: 0845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Andy Vann

Pace Analytical®
National Center for Testing & Innovation

Login #:L1093844	Client: SLRWLOR	Date: 4/30/19	Evaluated by: ERIC STRUCK

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time	X	Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	pH not in range.		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Couri
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments:

-Did not receive GP-MW-12-SS-18-19.

Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials:bjf	Client Contact:							

Login Instructions:

Proceed without **GP-MW-12-SS-18-19**

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 15, 2019

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2 Tc
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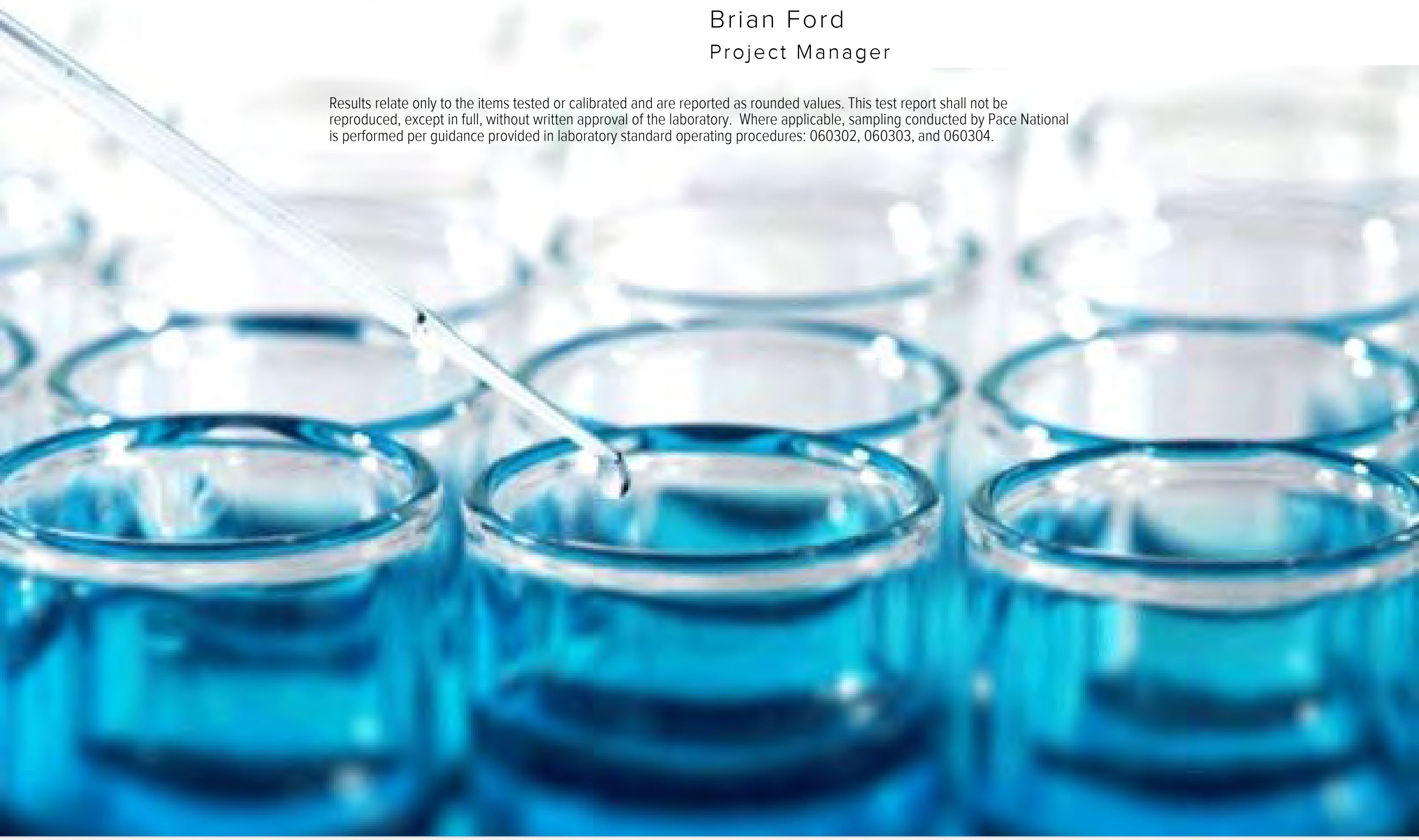
7 Gl
8 Al
9 Sc

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L1096002
Samples Received:	05/07/2019
Project Number:	108.00228.00059
Description:	Nord Door
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager



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MW-11A-0519 L1096002-01 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 15:37	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:13	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 15:58	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 15:43	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 13:47	05/10/19 13:47	ACG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1277353	1	05/09/19 07:50	05/10/19 05:05	AO	Mt. Juliet, TN

MW-11B-0519 L1096002-02 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 16:17	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 14:08	05/10/19 14:08	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1278026	1	05/08/19 17:50	05/11/19 00:43	SHG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1277353	1	05/09/19 07:50	05/10/19 05:26	AO	Mt. Juliet, TN

MW-12-0519 L1096002-03 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 11:20	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:16	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:17	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:02	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 14:29	05/10/19 14:29	ACG	Mt. Juliet, TN

MW-13-0519 L1096002-04 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 10:25	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:26	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:21	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:06	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1278048	1	05/09/19 07:30	05/10/19 00:37	AO	Mt. Juliet, TN

MW-14-0519 L1096002-05 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 12:07	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:28	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:26	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:11	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1278048	1	05/09/19 07:30	05/10/19 00:58	AO	Mt. Juliet, TN

MW-16-0519 L1096002-06 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 13:57	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:30	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:43	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:24	LD	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1278048	1	05/09/19 07:30	05/10/19 01:19	AO	Mt. Juliet, TN

MW-17-0519 L1096002-07 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 14:44	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1277537	1	05/07/19 21:00	05/08/19 10:33	SD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:48	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:29	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 14:50	05/10/19 14:50	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1278026	1	05/08/19 17:50	05/11/19 01:05	SHG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270D	WG1278048	1	05/09/19 07:30	05/10/19 01:39	AO	Mt. Juliet, TN

MW-15-0519 L1096002-08 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/03/19 13:15	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1278941	1	05/10/19 08:11	05/12/19 12:08	TCT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/14/19 16:52	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG1279590	1	05/13/19 15:03	05/15/19 16:34	LD	Mt. Juliet, TN

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Project Manager

Sample Handling and Receiving

The following analysis were performed from an unpreserved, insufficiently or inadequately preserved sample.

Lab Sample ID	Project Sample ID	Method
L1096002-08	MW-15-0519	6020B

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	U		0.0490	0.200	1	05/08/2019 10:13	WG1277537

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	U		0.754	2.00	1	05/15/2019 15:43	WG1279590
Arsenic	5.95	J6	0.250	2.00	1	05/14/2019 15:58	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 15:58	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 15:58	WG1279590
Chromium	20.5	J6 O1	0.540	2.00	1	05/14/2019 15:58	WG1279590
Copper	6.34	B O1	0.520	5.00	1	05/14/2019 15:58	WG1279590
Lead	1.01	J	0.240	2.00	1	05/14/2019 15:58	WG1279590
Nickel	4.17		0.350	2.00	1	05/14/2019 15:58	WG1279590
Selenium	0.490	B J	0.380	2.00	1	05/14/2019 15:58	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 15:58	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 15:58	WG1279590
Zinc	6.85	B J O1	2.56	25.0	1	05/14/2019 15:58	WG1279590

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	1.97	J	1.05	25.0	1	05/10/2019 13:47	WG1279226
Acrylonitrile	U		0.873	5.00	1	05/10/2019 13:47	WG1279226
Benzene	U		0.0896	0.500	1	05/10/2019 13:47	WG1279226
Bromobenzene	U		0.133	0.500	1	05/10/2019 13:47	WG1279226
Bromodichloromethane	U		0.0800	0.500	1	05/10/2019 13:47	WG1279226
Bromochloromethane	U		0.145	0.500	1	05/10/2019 13:47	WG1279226
Bromoform	U		0.186	0.500	1	05/10/2019 13:47	WG1279226
Bromomethane	U		0.157	2.50	1	05/10/2019 13:47	WG1279226
n-Butylbenzene	U		0.143	0.500	1	05/10/2019 13:47	WG1279226
sec-Butylbenzene	U		0.134	0.500	1	05/10/2019 13:47	WG1279226
tert-Butylbenzene	U		0.183	0.500	1	05/10/2019 13:47	WG1279226
Carbon disulfide	U		0.101	0.500	1	05/10/2019 13:47	WG1279226
Carbon tetrachloride	U		0.159	0.500	1	05/10/2019 13:47	WG1279226
Chlorobenzene	U		0.140	0.500	1	05/10/2019 13:47	WG1279226
Chlorodibromomethane	U		0.128	0.500	1	05/10/2019 13:47	WG1279226
Chloroethane	U		0.141	2.50	1	05/10/2019 13:47	WG1279226
Chloroform	U		0.0860	0.500	1	05/10/2019 13:47	WG1279226
Chloromethane	U		0.153	1.25	1	05/10/2019 13:47	WG1279226
2-Chlorotoluene	U		0.111	0.500	1	05/10/2019 13:47	WG1279226
4-Chlorotoluene	U		0.0972	0.500	1	05/10/2019 13:47	WG1279226
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/10/2019 13:47	WG1279226
1,2-Dibromoethane	U		0.193	0.500	1	05/10/2019 13:47	WG1279226
Dibromomethane	U		0.117	0.500	1	05/10/2019 13:47	WG1279226
1,2-Dichlorobenzene	U		0.101	0.500	1	05/10/2019 13:47	WG1279226
1,3-Dichlorobenzene	U		0.130	0.500	1	05/10/2019 13:47	WG1279226
1,4-Dichlorobenzene	U		0.121	0.500	1	05/10/2019 13:47	WG1279226
Dichlorodifluoromethane	U		0.127	2.50	1	05/10/2019 13:47	WG1279226
1,1-Dichloroethane	U		0.114	0.500	1	05/10/2019 13:47	WG1279226
1,2-Dichloroethane	U		0.108	0.500	1	05/10/2019 13:47	WG1279226
1,1-Dichloroethene	U		0.188	0.500	1	05/10/2019 13:47	WG1279226
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/10/2019 13:47	WG1279226
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/10/2019 13:47	WG1279226
1,2-Dichloropropane	U		0.190	0.500	1	05/10/2019 13:47	WG1279226
1,1-Dichloropropene	U		0.128	0.500	1	05/10/2019 13:47	WG1279226

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,3-Dichloropropane	U		0.147	1.00	1	05/10/2019 13:47	WG1279226
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/10/2019 13:47	WG1279226
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/10/2019 13:47	WG1279226
trans-1,4-Dichloro-2-butene	U	J0	0.257	5.00	1	05/10/2019 13:47	WG1279226
2,2-Dichloropropane	U		0.0929	0.500	1	05/10/2019 13:47	WG1279226
Di-isopropyl ether	U		0.0924	0.500	1	05/10/2019 13:47	WG1279226
Ethylbenzene	U		0.158	0.500	1	05/10/2019 13:47	WG1279226
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/10/2019 13:47	WG1279226
2-Hexanone	U		0.757	5.00	1	05/10/2019 13:47	WG1279226
n-Hexane	U		0.305	5.00	1	05/10/2019 13:47	WG1279226
Iodomethane	U		0.377	10.0	1	05/10/2019 13:47	WG1279226
Isopropylbenzene	U		0.126	0.500	1	05/10/2019 13:47	WG1279226
p-Isopropyltoluene	U		0.138	0.500	1	05/10/2019 13:47	WG1279226
2-Butanone (MEK)	U		1.28	5.00	1	05/10/2019 13:47	WG1279226
Methylene Chloride	U		1.07	2.50	1	05/10/2019 13:47	WG1279226
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/10/2019 13:47	WG1279226
Methyl tert-butyl ether	U		0.102	0.500	1	05/10/2019 13:47	WG1279226
Naphthalene	0.188	B J	0.174	2.50	1	05/10/2019 13:47	WG1279226
n-Propylbenzene	U		0.162	0.500	1	05/10/2019 13:47	WG1279226
Styrene	U		0.117	0.500	1	05/10/2019 13:47	WG1279226
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/10/2019 13:47	WG1279226
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/10/2019 13:47	WG1279226
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/10/2019 13:47	WG1279226
Tetrachloroethene	U		0.199	0.500	1	05/10/2019 13:47	WG1279226
Toluene	U		0.412	0.500	1	05/10/2019 13:47	WG1279226
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/10/2019 13:47	WG1279226
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/10/2019 13:47	WG1279226
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/10/2019 13:47	WG1279226
1,1,2-Trichloroethane	U		0.186	0.500	1	05/10/2019 13:47	WG1279226
Trichloroethene	U		0.153	0.500	1	05/10/2019 13:47	WG1279226
Trichlorofluoromethane	U		0.130	2.50	1	05/10/2019 13:47	WG1279226
1,2,3-Trichloropropane	U		0.247	2.50	1	05/10/2019 13:47	WG1279226
1,2,4-Trimethylbenzene	0.151	J	0.123	0.500	1	05/10/2019 13:47	WG1279226
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/10/2019 13:47	WG1279226
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/10/2019 13:47	WG1279226
Vinyl acetate	U	J0	0.645	5.00	1	05/10/2019 13:47	WG1279226
Vinyl chloride	U		0.118	0.500	1	05/10/2019 13:47	WG1279226
Xylenes, Total	U		0.316	1.50	1	05/10/2019 13:47	WG1279226
(S) Toluene-d8	*94.1*			*80.0-120*		*05/10/2019 13:47*	WG1279226
(S) 4-Bromofluorobenzene	*112*			*77.0-126*		*05/10/2019 13:47*	WG1279226
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*		*05/10/2019 13:47*	WG1279226

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	32.0		0.316	1.00	1	05/10/2019 05:05	WG1277353
Acenaphthylene	U		0.309	1.00	1	05/10/2019 05:05	WG1277353
Anthracene	U		0.291	1.00	1	05/10/2019 05:05	WG1277353
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 05:05	WG1277353
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 05:05	WG1277353
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 05:05	WG1277353
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 05:05	WG1277353
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 05:05	WG1277353
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 05:05	WG1277353
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 05:05	WG1277353
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 05:05	WG1277353

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 05:05	WG1277353
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 05:05	WG1277353
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 05:05	WG1277353
Chrysene	U		0.332	1.00	1	05/10/2019 05:05	WG1277353
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 05:05	WG1277353
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 05:05	WG1277353
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 05:05	WG1277353
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 05:05	WG1277353
Fluoranthene	U		0.310	1.00	1	05/10/2019 05:05	WG1277353
Fluorene	19.1		0.323	1.00	1	05/10/2019 05:05	WG1277353
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 05:05	WG1277353
Hexachloro-1,3-butadiene	U	J4	0.329	10.0	1	05/10/2019 05:05	WG1277353
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 05:05	WG1277353
Hexachloroethane	U	J4	0.365	10.0	1	05/10/2019 05:05	WG1277353
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 05:05	WG1277353
Isophorone	U		0.272	10.0	1	05/10/2019 05:05	WG1277353
Naphthalene	U		0.372	1.00	1	05/10/2019 05:05	WG1277353
Nitrobenzene	U		0.367	10.0	1	05/10/2019 05:05	WG1277353
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 05:05	WG1277353
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 05:05	WG1277353
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 05:05	WG1277353
Phenanthrene	14.1		0.366	1.00	1	05/10/2019 05:05	WG1277353
Pyridine	U		1.37	10.0	1	05/10/2019 05:05	WG1277353
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 05:05	WG1277353
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 05:05	WG1277353
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 05:05	WG1277353
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 05:05	WG1277353
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 05:05	WG1277353
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 05:05	WG1277353
Pyrene	U		0.330	1.00	1	05/10/2019 05:05	WG1277353
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 05:05	WG1277353
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 05:05	WG1277353
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 05:05	WG1277353
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 05:05	WG1277353
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 05:05	WG1277353
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 05:05	WG1277353
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 05:05	WG1277353
2-Methylphenol	U		0.312	10.0	1	05/10/2019 05:05	WG1277353
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 05:05	WG1277353
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 05:05	WG1277353
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 05:05	WG1277353
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 05:05	WG1277353
Phenol	1.29	J	0.334	10.0	1	05/10/2019 05:05	WG1277353
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 05:05	WG1277353
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 05:05	WG1277353
(S) 2-Fluorophenol	*16.9*			*10.0-120*		*05/10/2019 05:05*	WG1277353
(S) Phenol-d5	*13.7*			*10.0-120*		*05/10/2019 05:05*	WG1277353
(S) Nitrobenzene-d5	*22.8*			*10.0-127*		*05/10/2019 05:05*	WG1277353
(S) 2-Fluorobiphenyl	*34.1*			*10.0-130*		*05/10/2019 05:05*	WG1277353
(S) 2,4,6-Tribromophenol	*45.6*			*10.0-155*		*05/10/2019 05:05*	WG1277353
(S) p-Terphenyl-d14	*48.7*			*10.0-128*		*05/10/2019 05:05*	WG1277353

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	4.20	J	1.05	25.0	1	05/10/2019 14:08	WG1279226
Acrylonitrile	U		0.873	5.00	1	05/10/2019 14:08	WG1279226
Benzene	U		0.0896	0.500	1	05/10/2019 14:08	WG1279226
Bromobenzene	U		0.133	0.500	1	05/10/2019 14:08	WG1279226
Bromodichloromethane	U		0.0800	0.500	1	05/10/2019 14:08	WG1279226
Bromochloromethane	U		0.145	0.500	1	05/10/2019 14:08	WG1279226
Bromoform	U		0.186	0.500	1	05/10/2019 14:08	WG1279226
Bromomethane	U		0.157	2.50	1	05/10/2019 14:08	WG1279226
n-Butylbenzene	U		0.143	0.500	1	05/10/2019 14:08	WG1279226
sec-Butylbenzene	U		0.134	0.500	1	05/10/2019 14:08	WG1279226
tert-Butylbenzene	U		0.183	0.500	1	05/10/2019 14:08	WG1279226
Carbon disulfide	U		0.101	0.500	1	05/10/2019 14:08	WG1279226
Carbon tetrachloride	U		0.159	0.500	1	05/10/2019 14:08	WG1279226
Chlorobenzene	U		0.140	0.500	1	05/10/2019 14:08	WG1279226
Chlorodibromomethane	U		0.128	0.500	1	05/10/2019 14:08	WG1279226
Chloroethane	U		0.141	2.50	1	05/10/2019 14:08	WG1279226
Chloroform	1.32		0.0860	0.500	1	05/10/2019 14:08	WG1279226
Chloromethane	U		0.153	1.25	1	05/10/2019 14:08	WG1279226
2-Chlorotoluene	U		0.111	0.500	1	05/10/2019 14:08	WG1279226
4-Chlorotoluene	U		0.0972	0.500	1	05/10/2019 14:08	WG1279226
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/10/2019 14:08	WG1279226
1,2-Dibromoethane	U		0.193	0.500	1	05/10/2019 14:08	WG1279226
Dibromomethane	U		0.117	0.500	1	05/10/2019 14:08	WG1279226
1,2-Dichlorobenzene	U		0.101	0.500	1	05/10/2019 14:08	WG1279226
1,3-Dichlorobenzene	U		0.130	0.500	1	05/10/2019 14:08	WG1279226
1,4-Dichlorobenzene	U		0.121	0.500	1	05/10/2019 14:08	WG1279226
Dichlorodifluoromethane	U		0.127	2.50	1	05/10/2019 14:08	WG1279226
1,1-Dichloroethane	U		0.114	0.500	1	05/10/2019 14:08	WG1279226
1,2-Dichloroethane	U		0.108	0.500	1	05/10/2019 14:08	WG1279226
1,1-Dichloroethene	U		0.188	0.500	1	05/10/2019 14:08	WG1279226
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/10/2019 14:08	WG1279226
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/10/2019 14:08	WG1279226
1,2-Dichloropropane	U		0.190	0.500	1	05/10/2019 14:08	WG1279226
1,1-Dichloropropene	U		0.128	0.500	1	05/10/2019 14:08	WG1279226
1,3-Dichloropropane	U		0.147	1.00	1	05/10/2019 14:08	WG1279226
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/10/2019 14:08	WG1279226
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/10/2019 14:08	WG1279226
trans-1,4-Dichloro-2-butene	U	J0	0.257	5.00	1	05/10/2019 14:08	WG1279226
2,2-Dichloropropane	U		0.0929	0.500	1	05/10/2019 14:08	WG1279226
Di-isopropyl ether	U		0.0924	0.500	1	05/10/2019 14:08	WG1279226
Ethylbenzene	U		0.158	0.500	1	05/10/2019 14:08	WG1279226
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/10/2019 14:08	WG1279226
2-Hexanone	U		0.757	5.00	1	05/10/2019 14:08	WG1279226
n-Hexane	U		0.305	5.00	1	05/10/2019 14:08	WG1279226
Iodomethane	U		0.377	10.0	1	05/10/2019 14:08	WG1279226
Isopropylbenzene	U		0.126	0.500	1	05/10/2019 14:08	WG1279226
p-Isopropyltoluene	U		0.138	0.500	1	05/10/2019 14:08	WG1279226
2-Butanone (MEK)	U		1.28	5.00	1	05/10/2019 14:08	WG1279226
Methylene Chloride	U		1.07	2.50	1	05/10/2019 14:08	WG1279226
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/10/2019 14:08	WG1279226
Methyl tert-butyl ether	U		0.102	0.500	1	05/10/2019 14:08	WG1279226
Naphthalene	U		0.174	2.50	1	05/10/2019 14:08	WG1279226
n-Propylbenzene	U		0.162	0.500	1	05/10/2019 14:08	WG1279226
Styrene	U		0.117	0.500	1	05/10/2019 14:08	WG1279226
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/10/2019 14:08	WG1279226
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/10/2019 14:08	WG1279226

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/10/2019 14:08	WG1279226
Tetrachloroethene	U		0.199	0.500	1	05/10/2019 14:08	WG1279226
Toluene	U		0.412	0.500	1	05/10/2019 14:08	WG1279226
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/10/2019 14:08	WG1279226
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/10/2019 14:08	WG1279226
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/10/2019 14:08	WG1279226
1,1,2-Trichloroethane	U		0.186	0.500	1	05/10/2019 14:08	WG1279226
Trichloroethene	U		0.153	0.500	1	05/10/2019 14:08	WG1279226
Trichlorofluoromethane	U		0.130	2.50	1	05/10/2019 14:08	WG1279226
1,2,3-Trichloropropane	U		0.247	2.50	1	05/10/2019 14:08	WG1279226
1,2,4-Trimethylbenzene	U		0.123	0.500	1	05/10/2019 14:08	WG1279226
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/10/2019 14:08	WG1279226
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/10/2019 14:08	WG1279226
Vinyl acetate	U	J0	0.645	5.00	1	05/10/2019 14:08	WG1279226
Vinyl chloride	U		0.118	0.500	1	05/10/2019 14:08	WG1279226
Xylenes, Total	U		0.316	1.50	1	05/10/2019 14:08	WG1279226
(S) Toluene-d8	*92.8*			*80.0-120*		*05/10/2019 14:08*	WG1279226
(S) 4-Bromofluorobenzene	*105*			*77.0-126*		*05/10/2019 14:08*	WG1279226
(S) 1,2-Dichloroethane-d4	*98.4*			*70.0-130*		*05/10/2019 14:08*	WG1279226

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.7	200	1	05/11/2019 00:43	WG1278026
Residual Range Organics (RRO)	U		83.3	250	1	05/11/2019 00:43	WG1278026
(S) o-Terphenyl	*91.1*			*52.0-156*		*05/11/2019 00:43*	WG1278026

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.316	1.00	1	05/10/2019 05:26	WG1277353
Acenaphthylene	U		0.309	1.00	1	05/10/2019 05:26	WG1277353
Anthracene	U		0.291	1.00	1	05/10/2019 05:26	WG1277353
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 05:26	WG1277353
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 05:26	WG1277353
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 05:26	WG1277353
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 05:26	WG1277353
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 05:26	WG1277353
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 05:26	WG1277353
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 05:26	WG1277353
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 05:26	WG1277353
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 05:26	WG1277353
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 05:26	WG1277353
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 05:26	WG1277353
Chrysene	U		0.332	1.00	1	05/10/2019 05:26	WG1277353
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 05:26	WG1277353
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 05:26	WG1277353
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 05:26	WG1277353
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 05:26	WG1277353
Fluoranthene	U		0.310	1.00	1	05/10/2019 05:26	WG1277353
Fluorene	U		0.323	1.00	1	05/10/2019 05:26	WG1277353
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 05:26	WG1277353
Hexachloro-1,3-butadiene	U	J4	0.329	10.0	1	05/10/2019 05:26	WG1277353
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 05:26	WG1277353
Hexachloroethane	U	J4	0.365	10.0	1	05/10/2019 05:26	WG1277353

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 05:26	WG1277353
Isophorone	U		0.272	10.0	1	05/10/2019 05:26	WG1277353
Naphthalene	U		0.372	1.00	1	05/10/2019 05:26	WG1277353
Nitrobenzene	U		0.367	10.0	1	05/10/2019 05:26	WG1277353
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 05:26	WG1277353
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 05:26	WG1277353
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 05:26	WG1277353
Phenanthrene	U		0.366	1.00	1	05/10/2019 05:26	WG1277353
Pyridine	U		1.37	10.0	1	05/10/2019 05:26	WG1277353
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 05:26	WG1277353
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 05:26	WG1277353
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 05:26	WG1277353
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 05:26	WG1277353
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 05:26	WG1277353
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 05:26	WG1277353
Pyrene	U		0.330	1.00	1	05/10/2019 05:26	WG1277353
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 05:26	WG1277353
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 05:26	WG1277353
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 05:26	WG1277353
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 05:26	WG1277353
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 05:26	WG1277353
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 05:26	WG1277353
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 05:26	WG1277353
2-Methylphenol	U		0.312	10.0	1	05/10/2019 05:26	WG1277353
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 05:26	WG1277353
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 05:26	WG1277353
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 05:26	WG1277353
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 05:26	WG1277353
Phenol	2.89	J	0.334	10.0	1	05/10/2019 05:26	WG1277353
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 05:26	WG1277353
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 05:26	WG1277353
(S) 2-Fluorophenol	*34.1*			*10.0-120*		*05/10/2019 05:26*	WG1277353
(S) Phenol-d5	*22.8*			*10.0-120*		*05/10/2019 05:26*	WG1277353
(S) Nitrobenzene-d5	*43.5*			*10.0-127*		*05/10/2019 05:26*	WG1277353
(S) 2-Fluorobiphenyl	*53.1*			*10.0-130*		*05/10/2019 05:26*	WG1277353
(S) 2,4,6-Tribromophenol	*60.0*			*10.0-155*		*05/10/2019 05:26*	WG1277353
(S) p-Terphenyl-d14	*72.7*			*10.0-128*		*05/10/2019 05:26*	WG1277353

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	U		0.0490	0.200	1	05/08/2019 10:16	WG1277537

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	6.55		0.754	2.00	1	05/15/2019 16:02	WG1279590
Arsenic	18.7		0.250	2.00	1	05/14/2019 16:17	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:17	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:17	WG1279590
Chromium	4.82		0.540	2.00	1	05/14/2019 16:17	WG1279590
Copper	7.26	B	0.520	5.00	1	05/14/2019 16:17	WG1279590
Lead	11.2		0.240	2.00	1	05/14/2019 16:17	WG1279590
Nickel	7.67		0.350	2.00	1	05/14/2019 16:17	WG1279590
Selenium	U		0.380	2.00	1	05/14/2019 16:17	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:17	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:17	WG1279590
Zinc	27.7	B	2.56	25.0	1	05/14/2019 16:17	WG1279590

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	46.1		1.05	25.0	1	05/10/2019 14:29	WG1279226
Acrylonitrile	U		0.873	5.00	1	05/10/2019 14:29	WG1279226
Benzene	0.207	J	0.0896	0.500	1	05/10/2019 14:29	WG1279226
Bromobenzene	U		0.133	0.500	1	05/10/2019 14:29	WG1279226
Bromodichloromethane	U		0.0800	0.500	1	05/10/2019 14:29	WG1279226
Bromochloromethane	U		0.145	0.500	1	05/10/2019 14:29	WG1279226
Bromoform	U		0.186	0.500	1	05/10/2019 14:29	WG1279226
Bromomethane	U		0.157	2.50	1	05/10/2019 14:29	WG1279226
n-Butylbenzene	U		0.143	0.500	1	05/10/2019 14:29	WG1279226
sec-Butylbenzene	U		0.134	0.500	1	05/10/2019 14:29	WG1279226
tert-Butylbenzene	U		0.183	0.500	1	05/10/2019 14:29	WG1279226
Carbon disulfide	2.87		0.101	0.500	1	05/10/2019 14:29	WG1279226
Carbon tetrachloride	U		0.159	0.500	1	05/10/2019 14:29	WG1279226
Chlorobenzene	U		0.140	0.500	1	05/10/2019 14:29	WG1279226
Chlorodibromomethane	U		0.128	0.500	1	05/10/2019 14:29	WG1279226
Chloroethane	U		0.141	2.50	1	05/10/2019 14:29	WG1279226
Chloroform	U		0.0860	0.500	1	05/10/2019 14:29	WG1279226
Chloromethane	U		0.153	1.25	1	05/10/2019 14:29	WG1279226
2-Chlorotoluene	U		0.111	0.500	1	05/10/2019 14:29	WG1279226
4-Chlorotoluene	U		0.0972	0.500	1	05/10/2019 14:29	WG1279226
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/10/2019 14:29	WG1279226
1,2-Dibromoethane	U		0.193	0.500	1	05/10/2019 14:29	WG1279226
Dibromomethane	U		0.117	0.500	1	05/10/2019 14:29	WG1279226
1,2-Dichlorobenzene	U		0.101	0.500	1	05/10/2019 14:29	WG1279226
1,3-Dichlorobenzene	U		0.130	0.500	1	05/10/2019 14:29	WG1279226
1,4-Dichlorobenzene	U		0.121	0.500	1	05/10/2019 14:29	WG1279226
Dichlorodifluoromethane	U		0.127	2.50	1	05/10/2019 14:29	WG1279226
1,1-Dichloroethane	U		0.114	0.500	1	05/10/2019 14:29	WG1279226
1,2-Dichloroethane	U		0.108	0.500	1	05/10/2019 14:29	WG1279226
1,1-Dichloroethene	U		0.188	0.500	1	05/10/2019 14:29	WG1279226
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/10/2019 14:29	WG1279226
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/10/2019 14:29	WG1279226
1,2-Dichloropropane	U		0.190	0.500	1	05/10/2019 14:29	WG1279226
1,1-Dichloropropene	U		0.128	0.500	1	05/10/2019 14:29	WG1279226

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,3-Dichloropropane	U		0.147	1.00	1	05/10/2019 14:29	WG1279226
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/10/2019 14:29	WG1279226
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/10/2019 14:29	WG1279226
trans-1,4-Dichloro-2-butene	U	J0	0.257	5.00	1	05/10/2019 14:29	WG1279226
2,2-Dichloropropane	U		0.0929	0.500	1	05/10/2019 14:29	WG1279226
Di-isopropyl ether	U		0.0924	0.500	1	05/10/2019 14:29	WG1279226
Ethylbenzene	U		0.158	0.500	1	05/10/2019 14:29	WG1279226
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/10/2019 14:29	WG1279226
2-Hexanone	U		0.757	5.00	1	05/10/2019 14:29	WG1279226
n-Hexane	4.74	J	0.305	5.00	1	05/10/2019 14:29	WG1279226
Iodomethane	U		0.377	10.0	1	05/10/2019 14:29	WG1279226
Isopropylbenzene	U		0.126	0.500	1	05/10/2019 14:29	WG1279226
p-Isopropyltoluene	3.81		0.138	0.500	1	05/10/2019 14:29	WG1279226
2-Butanone (MEK)	4.21	J	1.28	5.00	1	05/10/2019 14:29	WG1279226
Methylene Chloride	U		1.07	2.50	1	05/10/2019 14:29	WG1279226
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/10/2019 14:29	WG1279226
Methyl tert-butyl ether	U		0.102	0.500	1	05/10/2019 14:29	WG1279226
Naphthalene	U		0.174	2.50	1	05/10/2019 14:29	WG1279226
n-Propylbenzene	U		0.162	0.500	1	05/10/2019 14:29	WG1279226
Styrene	U		0.117	0.500	1	05/10/2019 14:29	WG1279226
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/10/2019 14:29	WG1279226
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/10/2019 14:29	WG1279226
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/10/2019 14:29	WG1279226
Tetrachloroethene	U		0.199	0.500	1	05/10/2019 14:29	WG1279226
Toluene	U		0.412	0.500	1	05/10/2019 14:29	WG1279226
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/10/2019 14:29	WG1279226
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/10/2019 14:29	WG1279226
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/10/2019 14:29	WG1279226
1,1,2-Trichloroethane	U		0.186	0.500	1	05/10/2019 14:29	WG1279226
Trichloroethene	U		0.153	0.500	1	05/10/2019 14:29	WG1279226
Trichlorofluoromethane	U		0.130	2.50	1	05/10/2019 14:29	WG1279226
1,2,3-Trichloropropane	U		0.247	2.50	1	05/10/2019 14:29	WG1279226
1,2,4-Trimethylbenzene	U		0.123	0.500	1	05/10/2019 14:29	WG1279226
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/10/2019 14:29	WG1279226
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/10/2019 14:29	WG1279226
Vinyl acetate	U	J0	0.645	5.00	1	05/10/2019 14:29	WG1279226
Vinyl chloride	U		0.118	0.500	1	05/10/2019 14:29	WG1279226
Xylenes, Total	U		0.316	1.50	1	05/10/2019 14:29	WG1279226
(S) Toluene-d8	*92.7*			*80.0-120*		*05/10/2019 14:29*	WG1279226
(S) 4-Bromofluorobenzene	*111*			*77.0-126*		*05/10/2019 14:29*	WG1279226
(S) 1,2-Dichloroethane-d4	*99.7*			*70.0-130*		*05/10/2019 14:29*	WG1279226

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	0.0664	J	0.0490	0.200	1	05/08/2019 10:26	WG1277537

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	2.05		0.754	2.00	1	05/15/2019 16:06	WG1279590
Arsenic	4.38		0.250	2.00	1	05/14/2019 16:21	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:21	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:21	WG1279590
Chromium	2.45		0.540	2.00	1	05/14/2019 16:21	WG1279590
Copper	45.9		0.520	5.00	1	05/14/2019 16:21	WG1279590
Lead	23.6		0.240	2.00	1	05/14/2019 16:21	WG1279590
Nickel	2.96		0.350	2.00	1	05/14/2019 16:21	WG1279590
Selenium	0.683	B J	0.380	2.00	1	05/14/2019 16:21	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:21	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:21	WG1279590
Zinc	20.0	B J	2.56	25.0	1	05/14/2019 16:21	WG1279590

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.316	1.00	1	05/10/2019 00:37	WG1278048
Acenaphthylene	U		0.309	1.00	1	05/10/2019 00:37	WG1278048
Anthracene	U		0.291	1.00	1	05/10/2019 00:37	WG1278048
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 00:37	WG1278048
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 00:37	WG1278048
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 00:37	WG1278048
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 00:37	WG1278048
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 00:37	WG1278048
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 00:37	WG1278048
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 00:37	WG1278048
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 00:37	WG1278048
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 00:37	WG1278048
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 00:37	WG1278048
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 00:37	WG1278048
Chrysene	U		0.332	1.00	1	05/10/2019 00:37	WG1278048
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 00:37	WG1278048
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 00:37	WG1278048
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 00:37	WG1278048
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 00:37	WG1278048
Fluoranthene	U		0.310	1.00	1	05/10/2019 00:37	WG1278048
Fluorene	U		0.323	1.00	1	05/10/2019 00:37	WG1278048
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 00:37	WG1278048
Hexachloro-1,3-butadiene	U		0.329	10.0	1	05/10/2019 00:37	WG1278048
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 00:37	WG1278048
Hexachloroethane	U		0.365	10.0	1	05/10/2019 00:37	WG1278048
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 00:37	WG1278048
Isophorone	U		0.272	10.0	1	05/10/2019 00:37	WG1278048
Naphthalene	U		0.372	1.00	1	05/10/2019 00:37	WG1278048
Nitrobenzene	U		0.367	10.0	1	05/10/2019 00:37	WG1278048
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 00:37	WG1278048
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 00:37	WG1278048
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 00:37	WG1278048
Phenanthrene	U		0.366	1.00	1	05/10/2019 00:37	WG1278048
Pyridine	U		1.37	10.0	1	05/10/2019 00:37	WG1278048

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 00:37	WG1278048
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 00:37	WG1278048
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 00:37	WG1278048
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 00:37	WG1278048
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 00:37	WG1278048
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 00:37	WG1278048
Pyrene	U		0.330	1.00	1	05/10/2019 00:37	WG1278048
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 00:37	WG1278048
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 00:37	WG1278048
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 00:37	WG1278048
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 00:37	WG1278048
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 00:37	WG1278048
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 00:37	WG1278048
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 00:37	WG1278048
2-Methylphenol	U		0.312	10.0	1	05/10/2019 00:37	WG1278048
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 00:37	WG1278048
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 00:37	WG1278048
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 00:37	WG1278048
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 00:37	WG1278048
Phenol	1.40	J	0.334	10.0	1	05/10/2019 00:37	WG1278048
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 00:37	WG1278048
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 00:37	WG1278048
(S) 2-Fluorophenol	*34.2*			*10.0-120*		*05/10/2019 00:37*	WG1278048
(S) Phenol-d5	*22.5*			*10.0-120*		*05/10/2019 00:37*	WG1278048
(S) Nitrobenzene-d5	*54.0*			*10.0-127*		*05/10/2019 00:37*	WG1278048
(S) 2-Fluorobiphenyl	*56.6*			*10.0-130*		*05/10/2019 00:37*	WG1278048
(S) 2,4,6-Tribromophenol	*55.5*			*10.0-155*		*05/10/2019 00:37*	WG1278048
(S) p-Terphenyl-d14	*60.5*			*10.0-128*		*05/10/2019 00:37*	WG1278048

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	U		0.0490	0.200	1	05/08/2019 10:28	WG1277537

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	U		0.754	2.00	1	05/15/2019 16:11	WG1279590
Arsenic	16.6		0.250	2.00	1	05/14/2019 16:26	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:26	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:26	WG1279590
Chromium	3.55		0.540	2.00	1	05/14/2019 16:26	WG1279590
Copper	7.35	B	0.520	5.00	1	05/14/2019 16:26	WG1279590
Lead	2.10		0.240	2.00	1	05/14/2019 16:26	WG1279590
Nickel	2.85		0.350	2.00	1	05/14/2019 16:26	WG1279590
Selenium	0.413	B J	0.380	2.00	1	05/14/2019 16:26	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:26	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:26	WG1279590
Zinc	9.27	B J	2.56	25.0	1	05/14/2019 16:26	WG1279590

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.316	1.00	1	05/10/2019 00:58	WG1278048
Acenaphthylene	U		0.309	1.00	1	05/10/2019 00:58	WG1278048
Anthracene	0.361	J	0.291	1.00	1	05/10/2019 00:58	WG1278048
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 00:58	WG1278048
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 00:58	WG1278048
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 00:58	WG1278048
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 00:58	WG1278048
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 00:58	WG1278048
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 00:58	WG1278048
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 00:58	WG1278048
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 00:58	WG1278048
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 00:58	WG1278048
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 00:58	WG1278048
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 00:58	WG1278048
Chrysene	U		0.332	1.00	1	05/10/2019 00:58	WG1278048
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 00:58	WG1278048
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 00:58	WG1278048
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 00:58	WG1278048
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 00:58	WG1278048
Fluoranthene	U		0.310	1.00	1	05/10/2019 00:58	WG1278048
Fluorene	U		0.323	1.00	1	05/10/2019 00:58	WG1278048
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 00:58	WG1278048
Hexachloro-1,3-butadiene	U		0.329	10.0	1	05/10/2019 00:58	WG1278048
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 00:58	WG1278048
Hexachloroethane	U		0.365	10.0	1	05/10/2019 00:58	WG1278048
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 00:58	WG1278048
Isophorone	U		0.272	10.0	1	05/10/2019 00:58	WG1278048
Naphthalene	U		0.372	1.00	1	05/10/2019 00:58	WG1278048
Nitrobenzene	U		0.367	10.0	1	05/10/2019 00:58	WG1278048
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 00:58	WG1278048
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 00:58	WG1278048
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 00:58	WG1278048
Phenanthrene	U		0.366	1.00	1	05/10/2019 00:58	WG1278048
Pyridine	U		1.37	10.0	1	05/10/2019 00:58	WG1278048

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 00:58	WG1278048
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 00:58	WG1278048
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 00:58	WG1278048
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 00:58	WG1278048
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 00:58	WG1278048
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 00:58	WG1278048
Pyrene	U		0.330	1.00	1	05/10/2019 00:58	WG1278048
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 00:58	WG1278048
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 00:58	WG1278048
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 00:58	WG1278048
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 00:58	WG1278048
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 00:58	WG1278048
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 00:58	WG1278048
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 00:58	WG1278048
2-Methylphenol	U		0.312	10.0	1	05/10/2019 00:58	WG1278048
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 00:58	WG1278048
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 00:58	WG1278048
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 00:58	WG1278048
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 00:58	WG1278048
Phenol	9.50	J	0.334	10.0	1	05/10/2019 00:58	WG1278048
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 00:58	WG1278048
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 00:58	WG1278048
(S) 2-Fluorophenol	*41.7*			*10.0-120*		*05/10/2019 00:58*	WG1278048
(S) Phenol-d5	*27.0*			*10.0-120*		*05/10/2019 00:58*	WG1278048
(S) Nitrobenzene-d5	*62.2*			*10.0-127*		*05/10/2019 00:58*	WG1278048
(S) 2-Fluorobiphenyl	*62.7*			*10.0-130*		*05/10/2019 00:58*	WG1278048
(S) 2,4,6-Tribromophenol	*63.7*			*10.0-155*		*05/10/2019 00:58*	WG1278048
(S) p-Terphenyl-d14	*70.5*			*10.0-128*		*05/10/2019 00:58*	WG1278048

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	U		0.0490	0.200	1	05/08/2019 10:30	WG1277537

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	U		0.754	2.00	1	05/15/2019 16:24	WG1279590
Arsenic	3.03		0.250	2.00	1	05/14/2019 16:43	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:43	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:43	WG1279590
Chromium	1.24	J	0.540	2.00	1	05/14/2019 16:43	WG1279590
Copper	3.49	B J	0.520	5.00	1	05/14/2019 16:43	WG1279590
Lead	1.79	J	0.240	2.00	1	05/14/2019 16:43	WG1279590
Nickel	1.34	J	0.350	2.00	1	05/14/2019 16:43	WG1279590
Selenium	U		0.380	2.00	1	05/14/2019 16:43	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:43	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:43	WG1279590
Zinc	3.95	B J	2.56	25.0	1	05/14/2019 16:43	WG1279590

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	U		0.316	1.00	1	05/10/2019 01:19	WG1278048
Acenaphthylene	U		0.309	1.00	1	05/10/2019 01:19	WG1278048
Anthracene	U		0.291	1.00	1	05/10/2019 01:19	WG1278048
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 01:19	WG1278048
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 01:19	WG1278048
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 01:19	WG1278048
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 01:19	WG1278048
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 01:19	WG1278048
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 01:19	WG1278048
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 01:19	WG1278048
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 01:19	WG1278048
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 01:19	WG1278048
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 01:19	WG1278048
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 01:19	WG1278048
Chrysene	U		0.332	1.00	1	05/10/2019 01:19	WG1278048
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 01:19	WG1278048
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 01:19	WG1278048
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 01:19	WG1278048
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 01:19	WG1278048
Fluoranthene	U		0.310	1.00	1	05/10/2019 01:19	WG1278048
Fluorene	U		0.323	1.00	1	05/10/2019 01:19	WG1278048
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 01:19	WG1278048
Hexachloro-1,3-butadiene	U		0.329	10.0	1	05/10/2019 01:19	WG1278048
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 01:19	WG1278048
Hexachloroethane	U		0.365	10.0	1	05/10/2019 01:19	WG1278048
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 01:19	WG1278048
Isophorone	U		0.272	10.0	1	05/10/2019 01:19	WG1278048
Naphthalene	U		0.372	1.00	1	05/10/2019 01:19	WG1278048
Nitrobenzene	U		0.367	10.0	1	05/10/2019 01:19	WG1278048
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 01:19	WG1278048
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 01:19	WG1278048
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 01:19	WG1278048
Phenanthrene	U		0.366	1.00	1	05/10/2019 01:19	WG1278048
Pyridine	U		1.37	10.0	1	05/10/2019 01:19	WG1278048

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 01:19	WG1278048
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 01:19	WG1278048
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 01:19	WG1278048
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 01:19	WG1278048
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 01:19	WG1278048
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 01:19	WG1278048
Pyrene	U		0.330	1.00	1	05/10/2019 01:19	WG1278048
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 01:19	WG1278048
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 01:19	WG1278048
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 01:19	WG1278048
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 01:19	WG1278048
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 01:19	WG1278048
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 01:19	WG1278048
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 01:19	WG1278048
2-Methylphenol	U		0.312	10.0	1	05/10/2019 01:19	WG1278048
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 01:19	WG1278048
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 01:19	WG1278048
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 01:19	WG1278048
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 01:19	WG1278048
Phenol	1.34	J	0.334	10.0	1	05/10/2019 01:19	WG1278048
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 01:19	WG1278048
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 01:19	WG1278048
(S) 2-Fluorophenol	*37.6*			*10.0-120*		*05/10/2019 01:19*	WG1278048
(S) Phenol-d5	*22.8*			*10.0-120*		*05/10/2019 01:19*	WG1278048
(S) Nitrobenzene-d5	*59.0*			*10.0-127*		*05/10/2019 01:19*	WG1278048
(S) 2-Fluorobiphenyl	*60.1*			*10.0-130*		*05/10/2019 01:19*	WG1278048
(S) 2,4,6-Tribromophenol	*58.8*			*10.0-155*		*05/10/2019 01:19*	WG1278048
(S) p-Terphenyl-d14	*67.8*			*10.0-128*		*05/10/2019 01:19*	WG1278048

Mercury by Method 7470A

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Mercury	U		0.0490	0.200	1	05/08/2019 10:33	WG1277537

Metals (ICPMS) by Method 6020B

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Antimony	U		0.754	2.00	1	05/15/2019 16:29	WG1279590
Arsenic	43.9		0.250	2.00	1	05/14/2019 16:48	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:48	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:48	WG1279590
Chromium	6.43		0.540	2.00	1	05/14/2019 16:48	WG1279590
Copper	2.27	B J	0.520	5.00	1	05/14/2019 16:48	WG1279590
Lead	0.911	J	0.240	2.00	1	05/14/2019 16:48	WG1279590
Nickel	2.10		0.350	2.00	1	05/14/2019 16:48	WG1279590
Selenium	0.391	B J	0.380	2.00	1	05/14/2019 16:48	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:48	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:48	WG1279590
Zinc	3.76	B J	2.56	25.0	1	05/14/2019 16:48	WG1279590

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Acetone	3.22	J	1.05	25.0	1	05/10/2019 14:50	WG1279226
Acrylonitrile	U		0.873	5.00	1	05/10/2019 14:50	WG1279226
Benzene	U		0.0896	0.500	1	05/10/2019 14:50	WG1279226
Bromobenzene	U		0.133	0.500	1	05/10/2019 14:50	WG1279226
Bromodichloromethane	U		0.0800	0.500	1	05/10/2019 14:50	WG1279226
Bromochloromethane	U		0.145	0.500	1	05/10/2019 14:50	WG1279226
Bromoform	U		0.186	0.500	1	05/10/2019 14:50	WG1279226
Bromomethane	U		0.157	2.50	1	05/10/2019 14:50	WG1279226
n-Butylbenzene	U		0.143	0.500	1	05/10/2019 14:50	WG1279226
sec-Butylbenzene	U		0.134	0.500	1	05/10/2019 14:50	WG1279226
tert-Butylbenzene	U		0.183	0.500	1	05/10/2019 14:50	WG1279226
Carbon disulfide	U		0.101	0.500	1	05/10/2019 14:50	WG1279226
Carbon tetrachloride	U		0.159	0.500	1	05/10/2019 14:50	WG1279226
Chlorobenzene	U		0.140	0.500	1	05/10/2019 14:50	WG1279226
Chlorodibromomethane	U		0.128	0.500	1	05/10/2019 14:50	WG1279226
Chloroethane	U		0.141	2.50	1	05/10/2019 14:50	WG1279226
Chloroform	U		0.0860	0.500	1	05/10/2019 14:50	WG1279226
Chloromethane	U		0.153	1.25	1	05/10/2019 14:50	WG1279226
2-Chlorotoluene	U		0.111	0.500	1	05/10/2019 14:50	WG1279226
4-Chlorotoluene	U		0.0972	0.500	1	05/10/2019 14:50	WG1279226
1,2-Dibromo-3-Chloropropane	U		0.325	2.50	1	05/10/2019 14:50	WG1279226
1,2-Dibromoethane	U		0.193	0.500	1	05/10/2019 14:50	WG1279226
Dibromomethane	U		0.117	0.500	1	05/10/2019 14:50	WG1279226
1,2-Dichlorobenzene	U		0.101	0.500	1	05/10/2019 14:50	WG1279226
1,3-Dichlorobenzene	U		0.130	0.500	1	05/10/2019 14:50	WG1279226
1,4-Dichlorobenzene	U		0.121	0.500	1	05/10/2019 14:50	WG1279226
Dichlorodifluoromethane	U		0.127	2.50	1	05/10/2019 14:50	WG1279226
1,1-Dichloroethane	U		0.114	0.500	1	05/10/2019 14:50	WG1279226
1,2-Dichloroethane	U		0.108	0.500	1	05/10/2019 14:50	WG1279226
1,1-Dichloroethene	U		0.188	0.500	1	05/10/2019 14:50	WG1279226
cis-1,2-Dichloroethene	U		0.0933	0.500	1	05/10/2019 14:50	WG1279226
trans-1,2-Dichloroethene	U		0.152	0.500	1	05/10/2019 14:50	WG1279226
1,2-Dichloropropane	U		0.190	0.500	1	05/10/2019 14:50	WG1279226
1,1-Dichloropropene	U		0.128	0.500	1	05/10/2019 14:50	WG1279226

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
1,3-Dichloropropane	U		0.147	1.00	1	05/10/2019 14:50	WG1279226
cis-1,3-Dichloropropene	U		0.0976	0.500	1	05/10/2019 14:50	WG1279226
trans-1,3-Dichloropropene	U		0.222	0.500	1	05/10/2019 14:50	WG1279226
trans-1,4-Dichloro-2-butene	U	J0	0.257	5.00	1	05/10/2019 14:50	WG1279226
2,2-Dichloropropane	U		0.0929	0.500	1	05/10/2019 14:50	WG1279226
Di-isopropyl ether	U		0.0924	0.500	1	05/10/2019 14:50	WG1279226
Ethylbenzene	U		0.158	0.500	1	05/10/2019 14:50	WG1279226
Hexachloro-1,3-butadiene	U		0.157	1.00	1	05/10/2019 14:50	WG1279226
2-Hexanone	U		0.757	5.00	1	05/10/2019 14:50	WG1279226
n-Hexane	U		0.305	5.00	1	05/10/2019 14:50	WG1279226
Iodomethane	U		0.377	10.0	1	05/10/2019 14:50	WG1279226
Isopropylbenzene	U		0.126	0.500	1	05/10/2019 14:50	WG1279226
p-Isopropyltoluene	U		0.138	0.500	1	05/10/2019 14:50	WG1279226
2-Butanone (MEK)	U		1.28	5.00	1	05/10/2019 14:50	WG1279226
Methylene Chloride	U		1.07	2.50	1	05/10/2019 14:50	WG1279226
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00	1	05/10/2019 14:50	WG1279226
Methyl tert-butyl ether	U		0.102	0.500	1	05/10/2019 14:50	WG1279226
Naphthalene	U		0.174	2.50	1	05/10/2019 14:50	WG1279226
n-Propylbenzene	U		0.162	0.500	1	05/10/2019 14:50	WG1279226
Styrene	U		0.117	0.500	1	05/10/2019 14:50	WG1279226
1,1,1,2-Tetrachloroethane	U		0.120	0.500	1	05/10/2019 14:50	WG1279226
1,1,2,2-Tetrachloroethane	U		0.130	0.500	1	05/10/2019 14:50	WG1279226
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500	1	05/10/2019 14:50	WG1279226
Tetrachloroethene	U		0.199	0.500	1	05/10/2019 14:50	WG1279226
Toluene	U		0.412	0.500	1	05/10/2019 14:50	WG1279226
1,2,3-Trichlorobenzene	U		0.164	0.500	1	05/10/2019 14:50	WG1279226
1,2,4-Trichlorobenzene	U		0.355	0.500	1	05/10/2019 14:50	WG1279226
1,1,1-Trichloroethane	U		0.0940	0.500	1	05/10/2019 14:50	WG1279226
1,1,2-Trichloroethane	U		0.186	0.500	1	05/10/2019 14:50	WG1279226
Trichloroethene	U		0.153	0.500	1	05/10/2019 14:50	WG1279226
Trichlorofluoromethane	U		0.130	2.50	1	05/10/2019 14:50	WG1279226
1,2,3-Trichloropropane	U		0.247	2.50	1	05/10/2019 14:50	WG1279226
1,2,4-Trimethylbenzene	U		0.123	0.500	1	05/10/2019 14:50	WG1279226
1,2,3-Trimethylbenzene	U		0.0739	0.500	1	05/10/2019 14:50	WG1279226
1,3,5-Trimethylbenzene	U		0.124	0.500	1	05/10/2019 14:50	WG1279226
Vinyl acetate	U	J0	0.645	5.00	1	05/10/2019 14:50	WG1279226
Vinyl chloride	U		0.118	0.500	1	05/10/2019 14:50	WG1279226
Xylenes, Total	U		0.316	1.50	1	05/10/2019 14:50	WG1279226
(S) Toluene-d8	*98.0*			*80.0-120*		*05/10/2019 14:50*	WG1279226
(S) 4-Bromofluorobenzene	*111*			*77.0-126*		*05/10/2019 14:50*	WG1279226
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*		*05/10/2019 14:50*	WG1279226

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	130	J	66.7	200	1	05/11/2019 01:05	WG1278026
Residual Range Organics (RRO)	U		83.3	250	1	05/11/2019 01:05	WG1278026
(S) o-Terphenyl	*88.4*			*52.0-156*		*05/11/2019 01:05*	WG1278026

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acenaphthene	15.9		0.316	1.00	1	05/10/2019 01:39	WG1278048
Acenaphthylene	U		0.309	1.00	1	05/10/2019 01:39	WG1278048
Anthracene	U		0.291	1.00	1	05/10/2019 01:39	WG1278048
Benzo(a)anthracene	U		0.0975	1.00	1	05/10/2019 01:39	WG1278048
Benzo(b)fluoranthene	U		0.0896	1.00	1	05/10/2019 01:39	WG1278048
Benzo(k)fluoranthene	U		0.355	1.00	1	05/10/2019 01:39	WG1278048
Benzo(g,h,i)perylene	U		0.161	1.00	1	05/10/2019 01:39	WG1278048
Benzo(a)pyrene	U		0.340	1.00	1	05/10/2019 01:39	WG1278048
Bis(2-chlorethoxy)methane	U		0.329	10.0	1	05/10/2019 01:39	WG1278048
Bis(2-chloroethyl)ether	U		1.62	10.0	1	05/10/2019 01:39	WG1278048
Bis(2-chloroisopropyl)ether	U		0.445	10.0	1	05/10/2019 01:39	WG1278048
4-Bromophenyl-phenylether	U		0.335	10.0	1	05/10/2019 01:39	WG1278048
2-Chloronaphthalene	U		0.330	1.00	1	05/10/2019 01:39	WG1278048
4-Chlorophenyl-phenylether	U		0.303	10.0	1	05/10/2019 01:39	WG1278048
Chrysene	U		0.332	1.00	1	05/10/2019 01:39	WG1278048
Dibenz(a,h)anthracene	U		0.279	1.00	1	05/10/2019 01:39	WG1278048
3,3-Dichlorobenzidine	U		2.02	10.0	1	05/10/2019 01:39	WG1278048
2,4-Dinitrotoluene	U		1.65	10.0	1	05/10/2019 01:39	WG1278048
2,6-Dinitrotoluene	U		0.279	10.0	1	05/10/2019 01:39	WG1278048
Fluoranthene	U		0.310	1.00	1	05/10/2019 01:39	WG1278048
Fluorene	U		0.323	1.00	1	05/10/2019 01:39	WG1278048
Hexachlorobenzene	U		0.341	1.00	1	05/10/2019 01:39	WG1278048
Hexachloro-1,3-butadiene	U		0.329	10.0	1	05/10/2019 01:39	WG1278048
Hexachlorocyclopentadiene	U		2.33	10.0	1	05/10/2019 01:39	WG1278048
Hexachloroethane	U		0.365	10.0	1	05/10/2019 01:39	WG1278048
Indeno(1,2,3-cd)pyrene	U		0.279	1.00	1	05/10/2019 01:39	WG1278048
Isophorone	U		0.272	10.0	1	05/10/2019 01:39	WG1278048
Naphthalene	U		0.372	1.00	1	05/10/2019 01:39	WG1278048
Nitrobenzene	U		0.367	10.0	1	05/10/2019 01:39	WG1278048
n-Nitrosodimethylamine	U		1.26	10.0	1	05/10/2019 01:39	WG1278048
n-Nitrosodiphenylamine	U		1.19	10.0	1	05/10/2019 01:39	WG1278048
n-Nitrosodi-n-propylamine	U		0.403	10.0	1	05/10/2019 01:39	WG1278048
Phenanthrene	U		0.366	1.00	1	05/10/2019 01:39	WG1278048
Pyridine	U		1.37	10.0	1	05/10/2019 01:39	WG1278048
Benzylbutyl phthalate	U		0.275	3.00	1	05/10/2019 01:39	WG1278048
Bis(2-ethylhexyl)phthalate	U		0.709	3.00	1	05/10/2019 01:39	WG1278048
Di-n-butyl phthalate	U		0.266	3.00	1	05/10/2019 01:39	WG1278048
Diethyl phthalate	U		0.282	3.00	1	05/10/2019 01:39	WG1278048
Dimethyl phthalate	U		0.283	3.00	1	05/10/2019 01:39	WG1278048
Di-n-octyl phthalate	U		0.278	3.00	1	05/10/2019 01:39	WG1278048
Pyrene	U		0.330	1.00	1	05/10/2019 01:39	WG1278048
1,2,4-Trichlorobenzene	U		0.355	10.0	1	05/10/2019 01:39	WG1278048
4-Chloro-3-methylphenol	U		0.263	10.0	1	05/10/2019 01:39	WG1278048
2-Chlorophenol	U		0.283	10.0	1	05/10/2019 01:39	WG1278048
2,4-Dichlorophenol	U		0.284	10.0	1	05/10/2019 01:39	WG1278048
2,4-Dimethylphenol	U		0.264	10.0	1	05/10/2019 01:39	WG1278048
4,6-Dinitro-2-methylphenol	U		2.62	10.0	1	05/10/2019 01:39	WG1278048
2,4-Dinitrophenol	U		3.25	10.0	1	05/10/2019 01:39	WG1278048
2-Methylphenol	U		0.312	10.0	1	05/10/2019 01:39	WG1278048
3&4-Methyl Phenol	U		0.266	10.0	1	05/10/2019 01:39	WG1278048
2-Nitrophenol	U		0.320	10.0	1	05/10/2019 01:39	WG1278048
4-Nitrophenol	U		2.01	10.0	1	05/10/2019 01:39	WG1278048
Pentachlorophenol	U		0.313	10.0	1	05/10/2019 01:39	WG1278048
Phenol	3.08	J	0.334	10.0	1	05/10/2019 01:39	WG1278048
2,4,6-Trichlorophenol	U		0.297	10.0	1	05/10/2019 01:39	WG1278048
2,4,5-Trichlorophenol	U		0.236	10.0	1	05/10/2019 01:39	WG1278048

Semi Volatile Organic Compounds (GC/MS) by Method 8270D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
(S) 2-Fluorophenol	*38.4*			*10.0-120*		*05/10/2019 01:39*	WG1278048
(S) Phenol-d5	*23.5*			*10.0-120*		*05/10/2019 01:39*	WG1278048
(S) Nitrobenzene-d5	*59.7*			*10.0-127*		*05/10/2019 01:39*	WG1278048
(S) 2-Fluorobiphenyl	*60.8*			*10.0-130*		*05/10/2019 01:39*	WG1278048
(S) 2,4,6-Tribromophenol	*54.6*			*10.0-155*		*05/10/2019 01:39*	WG1278048
(S) p-Terphenyl-d14	*64.0*			*10.0-128*		*05/10/2019 01:39*	WG1278048

Mercury by Method 7470A

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Mercury	U		0.0490	0.200	1	05/12/2019 12:08	WG1278941

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	U		0.754	2.00	1	05/15/2019 16:34	WG1279590
Arsenic	0.587	J	0.250	2.00	1	05/14/2019 16:52	WG1279590
Beryllium	U		0.120	2.00	1	05/14/2019 16:52	WG1279590
Cadmium	U		0.160	1.00	1	05/14/2019 16:52	WG1279590
Chromium	1.29	J	0.540	2.00	1	05/14/2019 16:52	WG1279590
Copper	1.24	B J	0.520	5.00	1	05/14/2019 16:52	WG1279590
Lead	U		0.240	2.00	1	05/14/2019 16:52	WG1279590
Nickel	U		0.350	2.00	1	05/14/2019 16:52	WG1279590
Selenium	U		0.380	2.00	1	05/14/2019 16:52	WG1279590
Silver	U		0.310	2.00	1	05/14/2019 16:52	WG1279590
Thallium	U		0.190	2.00	1	05/14/2019 16:52	WG1279590
Zinc	U		2.56	25.0	1	05/14/2019 16:52	WG1279590

Method Blank (MB)

(MB) R3409247-1 05/08/19 09:44

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Mercury	U		0.0490	0.200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3409247-2 05/08/19 09:47 • (LCSD) R3409247-3 05/08/19 09:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	3.00	2.72	2.92	90.6	97.5	80.0-120			7.35	20

L1095453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1095453-01 05/08/19 09:56 • (MS) R3409247-4 05/08/19 09:59 • (MSD) R3409247-5 05/08/19 10:01

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	3.00	ND	2.90	3.17	96.8	106	1	75.0-125			8.80	20

Method Blank (MB)

(MB) R3410472-1 05/12/19 12:01

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Mercury	U		0.0490	0.200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410472-2 05/12/19 12:03 • (LCSD) R3410472-3 05/12/19 12:05

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	3.00	2.60	2.78	86.7	92.8	80.0-120			6.84	20

L1096002-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096002-08 05/12/19 12:08 • (MS) R3410472-4 05/12/19 12:10 • (MSD) R3410472-5 05/12/19 12:13

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	3.00	U	3.25	3.25	108	108	1	75.0-125			0.0492	20

Method Blank (MB)

(MB) R3411195-1 05/14/19 15:45

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Arsenic	U		0.250	2.00
Beryllium	U		0.120	2.00
Cadmium	U		0.160	1.00
Chromium	U		0.540	2.00
Copper	3.09	J	0.520	5.00
Lead	U		0.240	2.00
Nickel	U		0.350	2.00
Selenium	0.448	J	0.380	2.00
Silver	U		0.310	2.00
Thallium	U		0.190	2.00
Zinc	2.97	J	2.56	25.0

Method Blank (MB)

(MB) R3411551-1 05/15/19 15:29

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Antimony	U		0.754	2.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3411195-2 05/14/19 15:49 • (LCSD) R3411195-3 05/14/19 15:54

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	50.0	48.0	47.8	96.0	95.6	80.0-120			0.460	20
Beryllium	50.0	48.4	49.4	96.9	98.8	80.0-120			1.96	20
Cadmium	50.0	50.9	50.1	102	100	80.0-120			1.60	20
Chromium	50.0	48.9	48.7	97.9	97.3	80.0-120			0.528	20
Copper	50.0	47.7	47.5	95.3	95.0	80.0-120			0.335	20
Lead	50.0	49.6	49.4	99.2	98.8	80.0-120			0.365	20
Nickel	50.0	49.4	48.3	98.7	96.7	80.0-120			2.13	20
Selenium	50.0	52.8	52.0	106	104	80.0-120			1.64	20
Silver	50.0	49.5	49.7	99.0	99.4	80.0-120			0.406	20
Thallium	50.0	48.2	48.4	96.5	96.8	80.0-120			0.307	20
Zinc	50.0	49.2	50.3	98.3	101	80.0-120			2.24	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3411551-2 05/15/19 15:34 • (LCSD) R3411551-3 05/15/19 15:39

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	ug/l	ug/l	ug/l	%	%	%			%	%
Antimony	50.0	46.7	49.3	93.4	98.6	80.0-120			5.43	20

L1096002-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096002-01 05/14/19 15:58 • (MS) R3411195-5 05/14/19 16:07 • (MSD) R3411195-6 05/14/19 16:12

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Arsenic	50.0	5.95	42.9	50.3	73.9	88.7	1	75.0-125	J6		15.9	20
Beryllium	50.0	U	48.9	51.8	97.7	104	1	75.0-125			5.91	20
Cadmium	50.0	U	49.7	51.6	99.3	103	1	75.0-125			3.85	20
Chromium	50.0	20.5	54.8	66.0	68.5	91.0	1	75.0-125	J6		18.6	20
Copper	50.0	6.34	45.6	54.0	78.5	95.4	1	75.0-125			17.0	20
Lead	50.0	1.01	45.0	49.3	87.9	96.5	1	75.0-125			9.10	20
Nickel	50.0	4.17	42.0	50.0	75.7	91.7	1	75.0-125			17.4	20
Selenium	50.0	0.490	49.7	49.9	98.4	98.9	1	75.0-125			0.475	20
Silver	50.0	U	48.8	50.4	97.6	101	1	75.0-125			3.32	20
Thallium	50.0	U	43.7	47.2	87.3	94.5	1	75.0-125			7.84	20
Zinc	50.0	6.85	45.5	51.6	77.4	89.5	1	75.0-125			12.5	20

L1096002-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096002-01 05/15/19 15:43 • (MS) R3411551-5 05/15/19 15:52 • (MSD) R3411551-6 05/15/19 15:57

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Antimony	50.0	U	46.9	49.8	93.9	99.5	1	75.0-125			5.80	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3410741-3 05/10/19 10:50

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Acetone	U		1.05	25.0
Acrylonitrile	U		0.873	5.00
Benzene	U		0.0896	0.500
Bromobenzene	U		0.133	0.500
Bromodichloromethane	U		0.0800	0.500
Bromochloromethane	U		0.145	0.500
Bromoform	U		0.186	0.500
Bromomethane	U		0.157	2.50
n-Butylbenzene	U		0.143	0.500
sec-Butylbenzene	U		0.134	0.500
tert-Butylbenzene	U		0.183	0.500
Carbon disulfide	U		0.101	0.500
Carbon tetrachloride	U		0.159	0.500
Chlorobenzene	U		0.140	0.500
Chlorodibromomethane	U		0.128	0.500
Chloroethane	U		0.141	2.50
Chloroform	U		0.0860	0.500
Chloromethane	U		0.153	1.25
2-Chlorotoluene	U		0.111	0.500
4-Chlorotoluene	U		0.0972	0.500
1,2-Dibromo-3-Chloropropane	U		0.325	2.50
1,2-Dibromoethane	U		0.193	0.500
Dibromomethane	U		0.117	0.500
1,2-Dichlorobenzene	U		0.101	0.500
1,3-Dichlorobenzene	U		0.130	0.500
1,4-Dichlorobenzene	U		0.121	0.500
Dichlorodifluoromethane	U		0.127	2.50
1,1-Dichloroethane	U		0.114	0.500
1,2-Dichloroethane	U		0.108	0.500
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.0933	0.500
trans-1,2-Dichloroethene	U		0.152	0.500
1,2-Dichloropropane	U		0.190	0.500
1,1-Dichloropropene	U		0.128	0.500
1,3-Dichloropropane	U		0.147	1.00
cis-1,3-Dichloropropene	U		0.0976	0.500
trans-1,3-Dichloropropene	U		0.222	0.500
trans-1,4-Dichloro-2-butene	U		0.257	5.00
2,2-Dichloropropane	U		0.0929	0.500
Di-isopropyl ether	U		0.0924	0.500

Method Blank (MB)

(MB) R3410741-3 05/10/19 10:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Ethylbenzene	U		0.158	0.500
Hexachloro-1,3-butadiene	U		0.157	1.00
2-Hexanone	U		0.757	5.00
n-Hexane	U		0.305	5.00
Iodomethane	U		0.377	10.0
Isopropylbenzene	U		0.126	0.500
p-Isopropyltoluene	U		0.138	0.500
2-Butanone (MEK)	U		1.28	5.00
Methylene Chloride	U		1.07	2.50
4-Methyl-2-pentanone (MIBK)	U		0.823	5.00
Methyl tert-butyl ether	U		0.102	0.500
Naphthalene	0.260	J	0.174	2.50
n-Propylbenzene	U		0.162	0.500
Styrene	U		0.117	0.500
1,1,1,2-Tetrachloroethane	U		0.120	0.500
1,1,2,2-Tetrachloroethane	U		0.130	0.500
1,1,2-Trichlorotrifluoroethane	U		0.164	0.500
Tetrachloroethene	U		0.199	0.500
Toluene	U		0.412	0.500
1,2,3-Trichlorobenzene	U		0.164	0.500
1,2,4-Trichlorobenzene	U		0.355	0.500
1,1,1-Trichloroethane	U		0.0940	0.500
1,1,2-Trichloroethane	U		0.186	0.500
Trichloroethene	U		0.153	0.500
Trichlorofluoromethane	U		0.130	2.50
1,2,3-Trichloropropane	U		0.247	2.50
1,2,4-Trimethylbenzene	U		0.123	0.500
1,2,3-Trimethylbenzene	U		0.0739	0.500
1,3,5-Trimethylbenzene	U		0.124	0.500
Vinyl acetate	U		0.645	5.00
Vinyl chloride	U		0.118	0.500
Xylenes, Total	U		0.316	1.50
(S) Toluene-d8	*93.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*98.7*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410741-1 05/10/19 09:26 • (LCSD) R3410741-2 05/10/19 09:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	125	123	123	98.1	98.2	19.0-160			0.147	27
Acrylonitrile	125	122	117	97.7	93.5	55.0-149			4.45	20
Benzene	25.0	27.0	25.7	108	103	70.0-123			4.95	20
Bromobenzene	25.0	26.2	25.1	105	100	73.0-121			4.34	20
Bromodichloromethane	25.0	24.6	23.4	98.4	93.7	75.0-120			4.89	20
Bromochloromethane	25.0	26.7	26.6	107	106	76.0-122			0.541	20
Bromoform	25.0	23.9	23.2	95.5	92.7	68.0-132			2.98	20
Bromomethane	25.0	26.7	25.3	107	101	10.0-160			5.39	25
n-Butylbenzene	25.0	25.1	24.6	100	98.2	73.0-125			2.21	20
sec-Butylbenzene	25.0	26.6	26.4	106	106	75.0-125			0.735	20
tert-Butylbenzene	25.0	27.3	27.4	109	110	76.0-124			0.309	20
Carbon disulfide	25.0	25.3	23.2	101	92.8	61.0-128			8.58	20
Carbon tetrachloride	25.0	25.8	24.9	103	99.8	68.0-126			3.42	20
Chlorobenzene	25.0	25.5	24.3	102	97.4	80.0-121			4.80	20
Chlorodibromomethane	25.0	23.6	23.1	94.5	92.4	77.0-125			2.26	20
Chloroethane	25.0	25.8	24.3	103	97.2	47.0-150			5.84	20
Chloroform	25.0	25.6	24.6	102	98.4	73.0-120			4.05	20
Chloromethane	25.0	27.3	25.8	109	103	41.0-142			5.39	20
2-Chlorotoluene	25.0	25.7	25.2	103	101	76.0-123			1.98	20
4-Chlorotoluene	25.0	25.4	24.5	102	97.8	75.0-122			3.83	20
1,2-Dibromo-3-Chloropropane	25.0	24.3	24.1	97.3	96.6	58.0-134			0.733	20
1,2-Dibromoethane	25.0	24.8	23.4	99.3	93.5	80.0-122			5.94	20
Dibromomethane	25.0	24.8	23.1	99.3	92.4	80.0-120			7.19	20
1,2-Dichlorobenzene	25.0	25.6	25.2	102	101	79.0-121			1.62	20
1,3-Dichlorobenzene	25.0	25.3	24.0	101	96.2	79.0-120			4.99	20
1,4-Dichlorobenzene	25.0	24.7	23.9	99.0	95.6	79.0-120			3.54	20
Dichlorodifluoromethane	25.0	27.5	27.7	110	111	51.0-149			0.504	20
1,1-Dichloroethane	25.0	26.1	25.0	104	100	70.0-126			4.36	20
1,2-Dichloroethane	25.0	25.8	24.9	103	99.8	70.0-128			3.29	20
1,1-Dichloroethene	25.0	29.3	27.4	117	110	71.0-124			6.72	20
cis-1,2-Dichloroethene	25.0	26.1	25.4	104	102	73.0-120			2.71	20
trans-1,2-Dichloroethene	25.0	25.6	25.5	102	102	73.0-120			0.508	20
1,2-Dichloropropane	25.0	24.9	23.6	99.4	94.5	77.0-125			5.10	20
1,1-Dichloropropene	25.0	25.7	25.1	103	100	74.0-126			2.65	20
1,3-Dichloropropane	25.0	23.7	22.8	94.8	91.3	80.0-120			3.86	20
cis-1,3-Dichloropropene	25.0	23.9	22.1	95.4	88.6	80.0-123			7.47	20
trans-1,3-Dichloropropene	25.0	23.9	22.3	95.5	89.2	78.0-124			6.76	20
trans-1,4-Dichloro-2-butene	25.0	19.6	17.8	78.4	71.4	33.0-144			9.39	20
2,2-Dichloropropane	25.0	21.7	21.2	86.9	84.7	58.0-130			2.61	20
Di-isopropyl ether	25.0	24.9	24.2	99.5	96.7	58.0-138			2.83	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410741-1 05/10/19 09:26 • (LCSD) R3410741-2 05/10/19 09:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylbenzene	25.0	25.8	25.1	103	100	79.0-123			2.77	20
Hexachloro-1,3-butadiene	25.0	26.4	26.3	105	105	54.0-138			0.0685	20
2-Hexanone	125	118	115	94.2	92.4	67.0-149			1.96	20
n-Hexane	25.0	25.8	24.8	103	99.1	57.0-133			3.92	20
Iodomethane	125	121	120	96.5	96.3	33.0-147			0.211	26
Isopropylbenzene	25.0	25.9	25.7	104	103	76.0-127			0.669	20
p-Isopropyltoluene	25.0	26.5	25.4	106	102	76.0-125			4.31	20
2-Butanone (MEK)	125	114	107	90.9	85.9	44.0-160			5.65	20
Methylene Chloride	25.0	26.5	25.5	106	102	67.0-120			3.79	20
4-Methyl-2-pentanone (MIBK)	125	115	111	91.8	89.0	68.0-142			3.03	20
Methyl tert-butyl ether	25.0	27.3	26.4	109	106	68.0-125			3.19	20
Naphthalene	25.0	24.9	24.6	99.4	98.3	54.0-135			1.11	20
n-Propylbenzene	25.0	27.4	26.3	110	105	77.0-124			4.20	20
Styrene	25.0	26.0	24.3	104	97.4	73.0-130			6.49	20
1,1,1,2-Tetrachloroethane	25.0	25.0	24.8	100	99.1	75.0-125			0.864	20
1,1,2,2-Tetrachloroethane	25.0	25.6	24.7	102	98.8	65.0-130			3.54	20
1,1,2-Trichlorotrifluoroethane	25.0	27.2	25.9	109	104	69.0-132			4.69	20
Tetrachloroethene	25.0	25.1	24.5	101	97.8	72.0-132			2.72	20
Toluene	25.0	24.8	23.7	99.0	94.9	79.0-120			4.30	20
1,2,3-Trichlorobenzene	25.0	26.4	26.0	106	104	50.0-138			1.79	20
1,2,4-Trichlorobenzene	25.0	26.1	26.0	104	104	57.0-137			0.366	20
1,1,1-Trichloroethane	25.0	26.3	25.4	105	101	73.0-124			3.80	20
1,1,2-Trichloroethane	25.0	24.7	22.8	98.8	91.3	80.0-120			7.84	20
Trichloroethene	25.0	25.3	24.0	101	96.1	78.0-124			5.11	20
Trichlorofluoromethane	25.0	28.3	27.2	113	109	59.0-147			4.03	20
1,2,3-Trichloropropane	25.0	24.7	24.4	98.9	97.7	73.0-130			1.22	20
1,2,4-Trimethylbenzene	25.0	24.8	24.7	99.1	98.8	76.0-121			0.326	20
1,2,3-Trimethylbenzene	25.0	25.0	24.8	100	99.0	77.0-120			0.948	20
1,3,5-Trimethylbenzene	25.0	28.2	27.5	113	110	76.0-122			2.67	20
Vinyl acetate	125	83.9	78.2	67.2	62.6	11.0-160			7.05	20
Vinyl chloride	25.0	27.9	27.0	112	108	67.0-131			3.35	20
Xylenes, Total	75.0	77.0	77.1	103	103	79.0-123			0.130	20
(S) Toluene-d8				*95.1*	*95.2*	*80.0-120*				
(S) 4-Bromofluorobenzene				*94.0*	*100*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*108*	*103*	*70.0-130*				

Method Blank (MB)

(MB) R3410339-1 05/10/19 22:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*126*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410339-2 05/10/19 23:14 • (LCSD) R3410339-3 05/10/19 23:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	1500	1510	1560	101	104	50.0-150			3.26	20
(S) o-Terphenyl				*109*	*112*	*52.0-156*				

Method Blank (MB)

(MB) R3410003-3 05/10/19 02:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.316	1.00
Acenaphthylene	U		0.309	1.00
Anthracene	U		0.291	1.00
Benzo(a)anthracene	U		0.0975	1.00
Benzo(b)fluoranthene	U		0.0896	1.00
Benzo(k)fluoranthene	U		0.355	1.00
Benzo(g,h,i)perylene	U		0.161	1.00
Benzo(a)pyrene	U		0.340	1.00
Bis(2-chlorethoxy)methane	U		0.329	10.0
Bis(2-chloroethyl)ether	U		1.62	10.0
Bis(2-chloroisopropyl)ether	U		0.445	10.0
4-Bromophenyl-phenylether	U		0.335	10.0
2-Chloronaphthalene	U		0.330	1.00
4-Chlorophenyl-phenylether	U		0.303	10.0
Chrysene	U		0.332	1.00
Dibenz(a,h)anthracene	U		0.279	1.00
3,3-Dichlorobenzidine	U		2.02	10.0
2,4-Dinitrotoluene	U		1.65	10.0
2,6-Dinitrotoluene	U		0.279	10.0
Fluoranthene	U		0.310	1.00
Fluorene	U		0.323	1.00
Hexachlorobenzene	U		0.341	1.00
Hexachloro-1,3-butadiene	U		0.329	10.0
Hexachlorocyclopentadiene	U		2.33	10.0
Hexachloroethane	U		0.365	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.272	10.0
Naphthalene	U		0.372	1.00
Nitrobenzene	U		0.367	10.0
n-Nitrosodimethylamine	U		1.26	10.0
n-Nitrosodiphenylamine	U		1.19	10.0
n-Nitrosodi-n-propylamine	U		0.403	10.0
Phenanthrene	U		0.366	1.00
Benzylbutyl phthalate	U		0.275	3.00
Bis(2-ethylhexyl)phthalate	U		0.709	3.00
Di-n-butyl phthalate	U		0.266	3.00
Diethyl phthalate	U		0.282	3.00
Dimethyl phthalate	U		0.283	3.00
Di-n-octyl phthalate	U		0.278	3.00
Pyrene	U		0.330	1.00

Method Blank (MB)

(MB) R3410003-3 05/10/19 02:00

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyridine	U		1.37	10.0
1,2,4-Trichlorobenzene	U		0.355	10.0
4-Chloro-3-methylphenol	U		0.263	10.0
2-Chlorophenol	U		0.283	10.0
2-Methylphenol	U		0.312	10.0
3&4-Methyl Phenol	U		0.266	10.0
2,4-Dichlorophenol	U		0.284	10.0
2,4-Dimethylphenol	U		0.264	10.0
4,6-Dinitro-2-methylphenol	U		2.62	10.0
2,4-Dinitrophenol	U		3.25	10.0
2-Nitrophenol	U		0.320	10.0
4-Nitrophenol	U		2.01	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		0.334	10.0
2,4,5-Trichlorophenol	U		0.236	10.0
2,4,6-Trichlorophenol	U		0.297	10.0
(S) Nitrobenzene-d5	*32.0*			*10.0-127*
(S) 2-Fluorobiphenyl	*39.1*			*10.0-130*
(S) p-Terphenyl-d14	*79.2*			*10.0-128*
(S) Phenol-d5	*17.9*			*10.0-120*
(S) 2-Fluorophenol	*28.0*			*10.0-120*
(S) 2,4,6-Tribromophenol	*43.7*			*10.0-155*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410003-1 05/10/19 00:58 • (LCSD) R3410003-2 05/10/19 01:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	27.9	27.4	55.8	54.8	41.0-120			1.81	22
Acenaphthylene	50.0	29.5	28.9	59.0	57.8	43.0-120			2.05	22
Anthracene	50.0	33.1	35.3	66.2	70.6	45.0-120			6.43	20
Benzo(a)anthracene	50.0	35.6	39.8	71.2	79.6	47.0-120			11.1	20
Benzo(b)fluoranthene	50.0	36.2	40.3	72.4	80.6	46.0-120			10.7	20
Benzo(k)fluoranthene	50.0	35.1	39.5	70.2	79.0	46.0-120			11.8	21
Benzo(g,h,i)perylene	50.0	33.5	37.6	67.0	75.2	48.0-121			11.5	20
Benzo(a)pyrene	50.0	32.6	36.2	65.2	72.4	47.0-120			10.5	20
Bis(2-chlorethoxy)methane	50.0	25.8	25.2	51.6	50.4	33.0-120			2.35	24
Bis(2-chloroethyl)ether	50.0	26.9	24.0	53.8	48.0	23.0-120			11.4	33
Bis(2-chloroisopropyl)ether	50.0	24.3	22.5	48.6	45.0	28.0-120			7.69	31

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410003-1 05/10/19 00:58 • (LCSD) R3410003-2 05/10/19 01:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Bromophenyl-phenylether	50.0	31.1	33.7	62.2	67.4	45.0-120			8.02	20
2-Chloronaphthalene	50.0	25.3	23.8	50.6	47.6	37.0-120			6.11	25
4-Chlorophenyl-phenylether	50.0	29.4	30.1	58.8	60.2	44.0-120			2.35	20
Chrysene	50.0	32.3	36.2	64.6	72.4	48.0-120			11.4	20
Dibenz(a,h)anthracene	50.0	34.3	38.6	68.6	77.2	47.0-120			11.8	20
3,3-Dichlorobenzidine	100	59.3	63.2	59.3	63.2	44.0-120			6.37	20
2,4-Dinitrotoluene	50.0	32.6	35.9	65.2	71.8	49.0-124			9.64	20
2,6-Dinitrotoluene	50.0	31.3	32.7	62.6	65.4	46.0-120			4.37	21
Fluoranthene	50.0	35.4	39.2	70.8	78.4	51.0-120			10.2	20
Fluorene	50.0	30.9	31.2	61.8	62.4	47.0-120			0.966	20
Hexachlorobenzene	50.0	30.8	32.4	61.6	64.8	44.0-120			5.06	20
Hexachloro-1,3-butadiene	50.0	8.62	7.10	17.2	14.2	19.0-120	J4	J4	19.3	32
Hexachlorocyclopentadiene	50.0	16.0	12.6	32.0	25.2	15.0-120			23.8	31
Hexachloroethane	50.0	7.74	7.25	15.5	14.5	15.0-120		J4	6.54	37
Indeno(1,2,3-cd)pyrene	50.0	33.8	38.4	67.6	76.8	49.0-122			12.7	20
Isophorone	50.0	27.4	26.6	54.8	53.2	36.0-120			2.96	23
Naphthalene	50.0	21.2	19.3	42.4	38.6	27.0-120			9.38	27
Nitrobenzene	50.0	24.6	22.7	49.2	45.4	27.0-120			8.03	29
n-Nitrosodimethylamine	50.0	13.3	11.5	26.6	23.0	10.0-120			14.5	40
n-Nitrosodiphenylamine	50.0	31.0	32.1	62.0	64.2	47.0-120			3.49	20
n-Nitrosodi-n-propylamine	50.0	28.2	27.4	56.4	54.8	31.0-120			2.88	28
Phenanthrene	50.0	31.8	34.0	63.6	68.0	46.0-120			6.69	20
Benzylbutyl phthalate	50.0	33.2	36.8	66.4	73.6	43.0-121			10.3	20
Bis(2-ethylhexyl)phthalate	50.0	33.3	36.9	66.6	73.8	43.0-122			10.3	20
Di-n-butyl phthalate	50.0	36.5	40.1	73.0	80.2	49.0-121			9.40	20
Diethyl phthalate	50.0	32.8	34.8	65.6	69.6	48.0-122			5.92	20
Dimethyl phthalate	50.0	31.1	32.6	62.2	65.2	48.0-120			4.71	20
Di-n-octyl phthalate	50.0	33.0	36.1	66.0	72.2	42.0-125			8.97	20
Pyrene	50.0	35.6	39.7	71.2	79.4	47.0-120			10.9	20
Pyridine	50.0	8.59	9.62	17.2	19.2	10.0-120			11.3	38
1,2,4-Trichlorobenzene	50.0	14.4	12.1	28.8	24.2	24.0-120			17.4	29
4-Chloro-3-methylphenol	50.0	30.1	29.8	60.2	59.6	40.0-120			1.00	21
2-Chlorophenol	50.0	25.6	23.1	51.2	46.2	25.0-120			10.3	35
2-Methylphenol	50.0	24.5	22.5	49.0	45.0	28.0-120			8.51	29
3&4-Methyl Phenol	50.0	26.1	24.3	52.2	48.6	31.0-120			7.14	30
2,4-Dichlorophenol	50.0	27.1	26.1	54.2	52.2	36.0-120			3.76	26
2,4-Dimethylphenol	50.0	27.1	26.3	54.2	52.6	33.0-120			3.00	26
4,6-Dinitro-2-methylphenol	50.0	37.3	41.1	74.6	82.2	38.0-138			9.69	25
2,4-Dinitrophenol	50.0	30.2	32.6	60.4	65.2	10.0-120			7.64	39
2-Nitrophenol	50.0	27.7	26.5	55.4	53.0	31.0-120			4.43	29

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410003-1 05/10/19 00:58 • (LCSD) R3410003-2 05/10/19 01:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Nitrophenol	50.0	15.8	15.6	31.6	31.2	10.0-120			1.27	33
Pentachlorophenol	50.0	27.8	30.7	55.6	61.4	23.0-120			9.91	25
Phenol	50.0	12.6	10.4	25.2	20.8	10.0-120			19.1	36
2,4,5-Trichlorophenol	50.0	32.1	31.8	64.2	63.6	44.0-120			0.939	22
2,4,6-Trichlorophenol	50.0	32.2	33.0	64.4	66.0	42.0-120			2.45	23
(S) Nitrobenzene-d5				*51.5*	*47.7*	*10.0-127*				
(S) 2-Fluorobiphenyl				*54.6*	*53.0*	*10.0-130*				
(S) p-Terphenyl-d14				*66.8*	*76.0*	*10.0-128*				
(S) Phenol-d5				*23.0*	*19.0*	*10.0-120*				
(S) 2-Fluorophenol				*35.7*	*29.3*	*10.0-120*				
(S) 2,4,6-Tribromophenol				*58.0*	*65.0*	*10.0-155*				

Method Blank (MB)

(MB) R3409911-2 05/09/19 22:11

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acenaphthene	U		0.316	1.00
Acenaphthylene	U		0.309	1.00
Anthracene	U		0.291	1.00
Benzo(a)anthracene	U		0.0975	1.00
Benzo(b)fluoranthene	U		0.0896	1.00
Benzo(k)fluoranthene	U		0.355	1.00
Benzo(g,h,i)perylene	U		0.161	1.00
Benzo(a)pyrene	U		0.340	1.00
Bis(2-chlorethoxy)methane	U		0.329	10.0
Bis(2-chloroethyl)ether	U		1.62	10.0
Bis(2-chloroisopropyl)ether	U		0.445	10.0
4-Bromophenyl-phenylether	U		0.335	10.0
2-Chloronaphthalene	U		0.330	1.00
4-Chlorophenyl-phenylether	U		0.303	10.0
Chrysene	U		0.332	1.00
Dibenz(a,h)anthracene	U		0.279	1.00
3,3-Dichlorobenzidine	U		2.02	10.0
2,4-Dinitrotoluene	U		1.65	10.0
2,6-Dinitrotoluene	U		0.279	10.0
Fluoranthene	U		0.310	1.00
Fluorene	U		0.323	1.00
Hexachlorobenzene	U		0.341	1.00
Hexachloro-1,3-butadiene	U		0.329	10.0
Hexachlorocyclopentadiene	U		2.33	10.0
Hexachloroethane	U		0.365	10.0
Indeno(1,2,3-cd)pyrene	U		0.279	1.00
Isophorone	U		0.272	10.0
Naphthalene	U		0.372	1.00
Nitrobenzene	U		0.367	10.0
n-Nitrosodimethylamine	U		1.26	10.0
n-Nitrosodiphenylamine	U		1.19	10.0
n-Nitrosodi-n-propylamine	U		0.403	10.0
Phenanthrene	U		0.366	1.00
Benzylbutyl phthalate	U		0.275	3.00
Bis(2-ethylhexyl)phthalate	U		0.709	3.00
Di-n-butyl phthalate	U		0.266	3.00
Diethyl phthalate	U		0.282	3.00
Dimethyl phthalate	U		0.283	3.00
Di-n-octyl phthalate	U		0.278	3.00
Pyrene	U		0.330	1.00

Method Blank (MB)

(MB) R3409911-2 05/09/19 22:11

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Pyridine	U		1.37	10.0
1,2,4-Trichlorobenzene	U		0.355	10.0
4-Chloro-3-methylphenol	U		0.263	10.0
2-Chlorophenol	U		0.283	10.0
2-Methylphenol	U		0.312	10.0
3&4-Methyl Phenol	U		0.266	10.0
2,4-Dichlorophenol	U		0.284	10.0
2,4-Dimethylphenol	U		0.264	10.0
4,6-Dinitro-2-methylphenol	U		2.62	10.0
2,4-Dinitrophenol	U		3.25	10.0
2-Nitrophenol	U		0.320	10.0
4-Nitrophenol	U		2.01	10.0
Pentachlorophenol	U		0.313	10.0
Phenol	U		0.334	10.0
2,4,5-Trichlorophenol	U		0.236	10.0
2,4,6-Trichlorophenol	U		0.297	10.0
(S) Nitrobenzene-d5	*71.5*			*10.0-127*
(S) 2-Fluorobiphenyl	*68.8*			*10.0-130*
(S) p-Terphenyl-d14	*69.1*			*10.0-128*
(S) Phenol-d5	*29.0*			*10.0-120*
(S) 2-Fluorophenol	*47.4*			*10.0-120*
(S) 2,4,6-Tribromophenol	*53.0*			*10.0-155*

Laboratory Control Sample (LCS)

(LCS) R3409911-1 05/09/19 21:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acenaphthene	50.0	38.0	76.0	41.0-120	
Acenaphthylene	50.0	42.1	84.2	43.0-120	
Anthracene	50.0	38.3	76.6	45.0-120	
Benzo(a)anthracene	50.0	40.2	80.4	47.0-120	
Benzo(b)fluoranthene	50.0	40.9	81.8	46.0-120	
Benzo(k)fluoranthene	50.0	39.5	79.0	46.0-120	
Benzo(g,h,i)perylene	50.0	43.1	86.2	48.0-121	
Benzo(a)pyrene	50.0	36.7	73.4	47.0-120	
Bis(2-chlorethoxy)methane	50.0	33.5	67.0	33.0-120	
Bis(2-chloroethyl)ether	50.0	37.3	74.6	23.0-120	
Bis(2-chloroisopropyl)ether	50.0	35.9	71.8	28.0-120	

Laboratory Control Sample (LCS)

(LCS) R3409911-1 05/09/19 21:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
4-Bromophenyl-phenylether	50.0	39.3	78.6	45.0-120	
2-Chloronaphthalene	50.0	38.2	76.4	37.0-120	
4-Chlorophenyl-phenylether	50.0	40.2	80.4	44.0-120	
Chrysene	50.0	38.0	76.0	48.0-120	
Dibenz(a,h)anthracene	50.0	39.8	79.6	47.0-120	
3,3-Dichlorobenzidine	100	79.1	79.1	44.0-120	
2,4-Dinitrotoluene	50.0	40.2	80.4	49.0-124	
2,6-Dinitrotoluene	50.0	38.5	77.0	46.0-120	
Fluoranthene	50.0	41.2	82.4	51.0-120	
Fluorene	50.0	39.8	79.6	47.0-120	
Hexachlorobenzene	50.0	38.4	76.8	44.0-120	
Hexachloro-1,3-butadiene	50.0	36.0	72.0	19.0-120	
Hexachlorocyclopentadiene	50.0	34.2	68.4	15.0-120	
Hexachloroethane	50.0	36.5	73.0	15.0-120	
Indeno(1,2,3-cd)pyrene	50.0	37.2	74.4	49.0-122	
Isophorone	50.0	37.3	74.6	36.0-120	
Naphthalene	50.0	33.3	66.6	27.0-120	
Nitrobenzene	50.0	35.9	71.8	27.0-120	
n-Nitrosodimethylamine	50.0	29.2	58.4	10.0-120	
n-Nitrosodiphenylamine	50.0	38.6	77.2	47.0-120	
n-Nitrosodi-n-propylamine	50.0	39.6	79.2	31.0-120	
Phenanthrene	50.0	38.1	76.2	46.0-120	
Benzylbutyl phthalate	50.0	37.8	75.6	43.0-121	
Bis(2-ethylhexyl)phthalate	50.0	37.3	74.6	43.0-122	
Di-n-butyl phthalate	50.0	41.0	82.0	49.0-121	
Diethyl phthalate	50.0	39.1	78.2	48.0-122	
Dimethyl phthalate	50.0	40.4	80.8	48.0-120	
Di-n-octyl phthalate	50.0	37.2	74.4	42.0-125	
Pyrene	50.0	39.1	78.2	47.0-120	
Pyridine	50.0	21.2	42.4	10.0-120	
1,2,4-Trichlorobenzene	50.0	34.4	68.8	24.0-120	
4-Chloro-3-methylphenol	50.0	38.6	77.2	40.0-120	
2-Chlorophenol	50.0	37.4	74.8	25.0-120	
2-Methylphenol	50.0	35.5	71.0	28.0-120	
3&4-Methyl Phenol	50.0	37.1	74.2	31.0-120	
2,4-Dichlorophenol	50.0	38.0	76.0	36.0-120	
2,4-Dimethylphenol	50.0	37.6	75.2	33.0-120	
4,6-Dinitro-2-methylphenol	50.0	43.3	86.6	38.0-138	
2,4-Dinitrophenol	50.0	38.3	76.6	10.0-120	
2-Nitrophenol	50.0	38.0	76.0	31.0-120	

Laboratory Control Sample (LCS)

(LCS) R3409911-1 05/09/19 21:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
4-Nitrophenol	50.0	17.2	34.4	10.0-120	
Pentachlorophenol	50.0	34.8	69.6	23.0-120	
Phenol	50.0	18.3	36.6	10.0-120	
2,4,5-Trichlorophenol	50.0	42.7	85.4	44.0-120	
2,4,6-Trichlorophenol	50.0	42.2	84.4	42.0-120	
(S) Nitrobenzene-d5			*64.6*	*10.0-127*	
(S) 2-Fluorobiphenyl			*75.9*	*10.0-130*	
(S) p-Terphenyl-d14			*72.5*	*10.0-128*	
(S) Phenol-d5			*33.5*	*10.0-120*	
(S) 2-Fluorophenol			*53.5*	*10.0-120*	
(S) 2,4,6-Tribromophenol			*69.0*	*10.0-155*	

L1096042-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096042-01 05/10/19 02:21 • (MS) R3409911-3 05/10/19 02:42 • (MSD) R3409911-4 05/10/19 03:03

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acenaphthene	50.0	U	34.1	33.6	68.2	67.2	1	28.0-120			1.48	25
Acenaphthylene	50.0	U	36.5	36.4	73.0	72.8	1	31.0-121			0.274	25
Anthracene	50.0	U	35.9	35.6	71.8	71.2	1	36.0-120			0.839	23
Benzo(a)anthracene	50.0	U	35.5	32.2	71.0	64.4	1	39.0-120			9.75	23
Benzo(b)fluoranthene	50.0	U	32.4	29.4	64.8	58.8	1	37.0-120			9.71	23
Benzo(k)fluoranthene	50.0	U	31.2	26.7	62.4	53.4	1	37.0-120			15.5	26
Benzo(g,h,i)perylene	50.0	U	38.3	34.0	76.6	68.0	1	37.0-123			11.9	25
Benzo(a)pyrene	50.0	U	30.4	27.3	60.8	54.6	1	37.0-120			10.7	24
Bis(2-chlorethoxy)methane	50.0	U	29.7	30.5	59.4	61.0	1	17.0-120			2.66	31
Bis(2-chloroethyl)ether	50.0	U	39.2	40.2	78.4	80.4	1	14.0-120			2.52	33
Bis(2-chloroisopropyl)ether	50.0	U	52.8	53.4	106	107	1	18.0-120			1.13	34
4-Bromophenyl-phenylether	50.0	U	37.1	36.2	74.2	72.4	1	37.0-120			2.46	24
2-Chloronaphthalene	50.0	U	32.9	32.3	65.8	64.6	1	29.0-120			1.84	28
4-Chlorophenyl-phenylether	50.0	U	36.7	35.4	73.4	70.8	1	36.0-120			3.61	23
Chrysene	50.0	U	32.6	29.9	65.2	59.8	1	38.0-120			8.64	23
Dibenz(a,h)anthracene	50.0	U	35.0	30.0	70.0	60.0	1	36.0-121			15.4	24
3,3-Dichlorobenzidine	100	U	ND	ND	0.000	0.000	1	10.0-134	J6	J6	0.000	30
2,4-Dinitrotoluene	50.0	U	37.8	39.5	75.6	79.0	1	39.0-125			4.40	25
2,6-Dinitrotoluene	50.0	U	38.3	38.6	76.6	77.2	1	36.0-120			0.780	27
Fluoranthene	50.0	U	37.2	34.7	74.4	69.4	1	41.0-121			6.95	22
Fluorene	50.0	U	35.7	35.3	71.4	70.6	1	37.0-120			1.13	24
Hexachlorobenzene	50.0	U	36.6	34.1	73.2	68.2	1	35.0-122			7.07	24

L1096042-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096042-01 05/10/19 02:21 • (MS) R3409911-3 05/10/19 02:42 • (MSD) R3409911-4 05/10/19 03:03

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexachloro-1,3-butadiene	50.0	U	32.2	31.9	64.4	63.8	1	12.0-120			0.936	34
Hexachlorocyclopentadiene	50.0	U	21.6	17.4	43.2	34.8	1	10.0-120			21.5	33
Hexachloroethane	50.0	U	30.3	30.1	60.6	60.2	1	10.0-120			0.662	40
Indeno(1,2,3-cd)pyrene	50.0	U	35.4	30.8	70.8	61.6	1	38.0-125			13.9	24
Isophorone	50.0	U	32.9	33.0	65.8	66.0	1	21.0-120			0.303	27
Naphthalene	50.0	U	33.5	34.0	67.0	68.0	1	10.0-120			1.48	31
Nitrobenzene	50.0	U	36.1	36.6	72.2	73.2	1	12.0-120			1.38	30
n-Nitrosodimethylamine	50.0	953	46.7	44.9	0.000	0.000	1	10.0-120	V	V	3.93	40
n-Nitrosodiphenylamine	50.0	U	36.9	37.7	73.8	75.4	1	37.0-120			2.14	24
n-Nitrosodi-n-propylamine	50.0	U	92.6	94.4	185	189	1	16.0-120	J5	J5	1.93	30
Phenanthrene	50.0	U	35.2	34.8	70.4	69.6	1	33.0-120			1.14	22
Benzylbutyl phthalate	50.0	U	35.9	32.7	71.8	65.4	1	34.0-126			9.33	24
Bis(2-ethylhexyl)phthalate	50.0	1.57	33.1	28.6	63.1	54.1	1	33.0-126			14.6	25
Di-n-butyl phthalate	50.0	U	38.3	36.5	76.6	73.0	1	35.0-128			4.81	23
Diethyl phthalate	50.0	U	39.6	39.7	79.2	79.4	1	39.0-125			0.252	24
Dimethyl phthalate	50.0	U	36.4	36.6	72.8	73.2	1	37.0-120			0.548	24
Di-n-octyl phthalate	50.0	U	31.4	27.0	62.8	54.0	1	25.0-135			15.1	26
Pyrene	50.0	U	37.4	36.3	74.8	72.6	1	39.0-120			2.99	22
Pyridine	50.0	U	21.1	19.5	42.2	39.0	1	10.0-120			7.88	37
1,2,4-Trichlorobenzene	50.0	U	32.7	33.3	65.4	66.6	1	15.0-120			1.82	31
4-Chloro-3-methylphenol	50.0	U	44.9	45.6	89.8	91.2	1	26.0-120			1.55	27
2-Chlorophenol	50.0	U	32.1	32.5	64.2	65.0	1	18.0-120			1.24	34
2-Methylphenol	50.0	15.3	43.3	42.2	56.0	53.8	1	10.0-120			2.57	30
3&4-Methyl Phenol	50.0	53.3	93.6	92.7	80.6	78.8	1	10.0-120			0.966	36
2,4-Dichlorophenol	50.0	U	36.8	37.2	73.6	74.4	1	19.0-120			1.08	27
2,4-Dimethylphenol	50.0	U	49.2	49.7	98.4	99.4	1	15.0-120			1.01	28
4,6-Dinitro-2-methylphenol	50.0	U	38.6	37.1	77.2	74.2	1	10.0-144			3.96	39
2,4-Dinitrophenol	50.0	U	37.0	33.8	74.0	67.6	1	10.0-120			9.04	40
2-Nitrophenol	50.0	U	35.2	36.1	70.4	72.2	1	20.0-120			2.52	30
4-Nitrophenol	50.0	U	10.4	10.2	20.8	20.4	1	10.0-120			1.94	40
Pentachlorophenol	50.0	U	44.4	43.5	88.8	87.0	1	10.0-128			2.05	37
Phenol	50.0	34.5	54.9	56.1	40.8	43.2	1	10.0-120			2.16	40
2,4,5-Trichlorophenol	50.0	U	46.7	47.6	93.4	95.2	1	33.0-120			1.91	31
2,4,6-Trichlorophenol	50.0	U	42.2	43.0	84.4	86.0	1	26.0-120			1.88	31
(S) Nitrobenzene-d5					*65.7*	*65.2*		*10.0-127*				
(S) 2-Fluorobiphenyl					*239*	*235*		*10.0-130*	J1	J1		
(S) p-Terphenyl-d14					*68.4*	*60.8*		*10.0-128*				
(S) Phenol-d5					*48.7*	*47.3*		*10.0-120*				
(S) 2-Fluorophenol					*32.3*	*33.0*		*10.0-120*				
(S) 2,4,6-Tribromophenol					*77.5*	*81.5*		*10.0-155*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J0	J0: The identification of the analyte is acceptable, but the reported concentration is an estimate. The calibration met method criteria.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia[1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky[1,6]	90010
Kentucky[2]	16
Louisiana	AI30792
Louisiana[1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico[1]	n/a
New York	11742
North Carolina	Env375
North Carolina[1]	DW21704
North Carolina[3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee[1,4]	2006
Texas	T104704245-18-15
Texas[5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

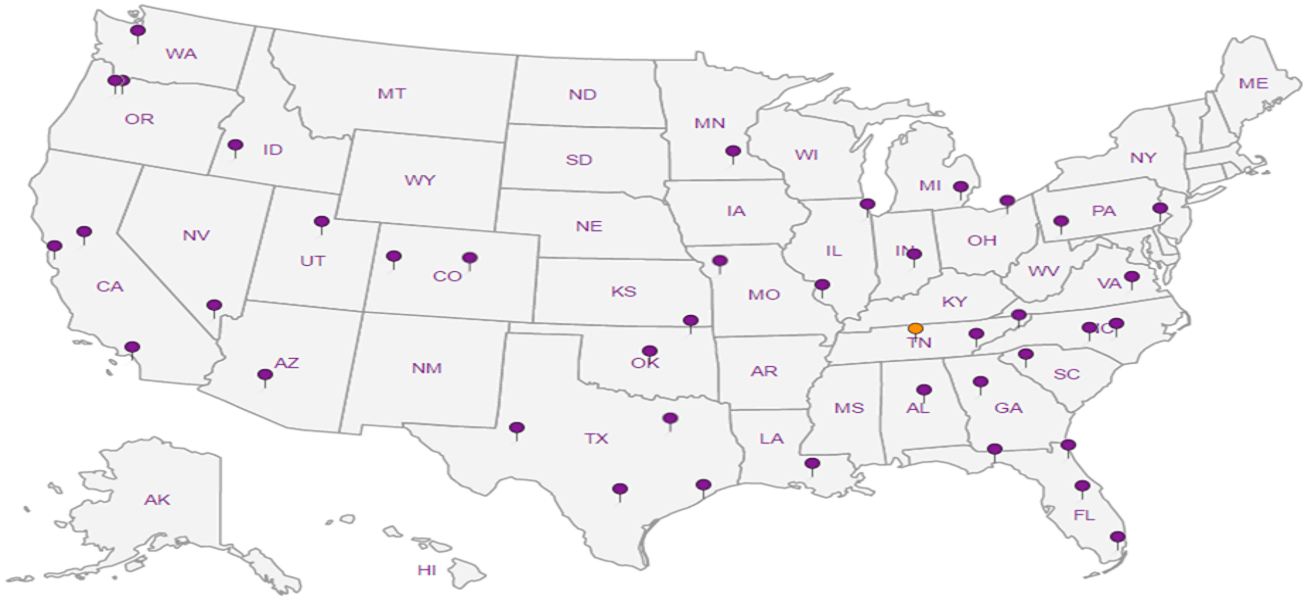
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025[5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



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CHAIN OF CUSTODY

D214

Lab #

L1096002

COC 1 of 1

PO#

Company: SLR	Project Mgr: Chris Kramer	Project Name: Nord Door	Project # 108.00228.00059
Address: 1800 Blankenship Rd, ste 440, West Linn, OR	Phone: (503) 723-4423	Fax:	Email: ckramer@slrconsulting.com

Sampled by: Steven Loskiben

Site Location: OR [✓ WA]
Other:

ANALYSIS REQUEST

	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn, TOTAL DISS TCLP <2	1200- COLS	1200-Z	~~Priority Pollutant 13 Metals~~						
1	MW-11A-0519		5/3/19	1537	water	6								X						X									-01
2	MW-11B-0519			1617		9		X		X				X															-02
3	MW-12-0519			1120		4				X										X									-03
4	MW-13-0519			1025		~~10~~ 3 cm								X						X									-04
5	MW-14-0519			1207		3								X						X									-05
6	MW-15-0519			1315		1														X									-08
7	MW-16-0519			1357		3								X						X									-06
8	MW-17-0519			1444		10		X		X				X						X									-07
9																													
10																													

Normal Turn Around Time (TAT) = 10 Business Days [✓ YES] NO

TAT Requested (circle)
1 Day 2 Day 3 Day
4 DAY 5 DAY Other: Standard TAT

SAMPLES ARE HELD FOR 30 DAYS

SPECIAL INSTRUCTIONS:

RAD SCREEN: <0.5 mR/hr

NCF

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Date:	Signature: Date: 5/7/19	Signature: Date:	Signature: Date:
Printed Name: Time:	Printed Name: Cole Madley Time: 8:45	Printed Name: Time:	Printed Name: Time:
Company:	Company: PACE	Company:	Company:

4686 6470 0221 Total = 29 Trip Blank = 1 0.5+0=0.5 PN NZ (OCS

Pace Analytical National Center for Testing & Innovation
Cooler Receipt Form

Client: SLRWLOR SDG#: L1096002

Cooler Received/Opened On: 5/7 /19 Temperature: 0.5

Received By: Cole Medley

Signature:

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?		✓	
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable		✓	
VOA Zero headspace?			
Preservation Correct / Checked?			✓

Troy Dunlap

Pace Analytical®
National Center for Testing & Innovation

Login #: L1096002	Client: SLRWLOR	Date: 5/7/19	Evaluated by: Troy Dunlap

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time		Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
X	pH not in range.		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courie
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: Metals received unpreserved for MW-15.

Client informed by:		Call		Email X		Voice Mail	Date:05/07/19	Time:1615
TSR Initials:bjf	Client Contact: Chris Kramer							

Login Instructions:

Please preserve and note time/date of pH adjustment.

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. ‘Xx’ denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the “D” indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the “S” indicates the split factor.

SGS CERTIFICATIONS

Alaska	17-012
Arkansas	18-042-0
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.1)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA031
Maine	2018018
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1535636
Mississippi	Reciprocity
Montana	0106
New Hampshire	208318 & 208518
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Vermont	VT-87634
Virginia	10101
Washington	C913
West Virginia	293

Rev. 06-Mar-2019

Sample ID: MW-16-0519 Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B3350	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Lab Sample ID	B3350_16740_DF_001	Date Extracted:	11-Jun-2019
Date Collected:	03-May-2019	pH:	6	QC Batch No:	16740	Date Analyzed:	18-Jun-2019
		Split:	-	Dilution:	-	Time Analyzed:	2:57:40

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	1.54			ES 2378-TCDD	102	
12378-PeCDD	ND	1.14			ES 12378-PeCDD	93.4	
123478-HxCDD	ND	1.04			ES 123478-HxCDD	91.1	
123678-HxCDD	ND	1.11			ES 123678-HxCDD	85.9	
123789-HxCDD	ND	0.943			ES 123789-HxCDD	90	
1234678-HpCDD	ND	1.45			ES 1234678-HpCDD	95.7	
OCDD	7.21			J	ES OCDD	110	
2378-TCDF	ND	1.49			ES 2378-TCDF	94.6	
12378-PeCDF	ND	1.05			ES 12378-PeCDF	92.7	
23478-PeCDF	ND	1.12			ES 23478-PeCDF	92.3	
123478-HxCDF	ND	0.737			ES 123478-HxCDF	86.7	
123678-HxCDF	ND	0.709			ES 123678-HxCDF	88	
234678-HxCDF	ND	0.739			ES 234678-HxCDF	86.2	
123789-HxCDF	ND	0.767			ES 123789-HxCDF	88.1	
1234678-HpCDF	ND	0.809			ES 1234678-HpCDF	88.1	
1234789-HpCDF	ND	0.89			ES 1234789-HpCDF	91.7	
OCDF	ND	1.2			ES OCDF	108	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	103	
Total TCDD	ND	1.54	ND		CS 12347-PeCDD	102	
Total PeCDD	ND	1.14	ND		CS 12346-PeCDF	98.1	
Total HxCDD	ND	1.03	ND		CS 123469-HxCDF	92.1	
Total HpCDD	ND	1.45	ND		CS 1234689-HpCDF	90.5	
Total TCDF	ND	1.49	ND				
Total PeCDF	ND	1.08	ND				
Total HxCDF	ND	0.736	ND				
Total HpCDF	ND	0.848	ND				
Total PCDD/Fs	**7.21**		**7.21**				
WHO-2005 TEQs							
TEQ: ND=0	0.00216		0.00216				
TEQ: ND=DL/2	1.92	1.92	1.92				
TEQ: ND=DL	3.84	3.84	3.84				

SGS

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

Sample ID: Method Blank B3350_16740 Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B3350	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Lab Sample ID	MB1_16740_DF_TLX	Date Extracted:	11-Jun-2019
Date Collected:	n/a	pH:	n/a	QC Batch No:	16740	Date Analyzed:	18-Jun-2019
		Split:	-	Dilution:	-	Time Analyzed:	1:22:44

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	1.87			ES 2378-TCDD	94.4	
12378-PeCDD	ND	1.66			ES 12378-PeCDD	89.4	
123478-HxCDD	ND	1.71			ES 123478-HxCDD	90.6	
123678-HxCDD	ND	1.83			ES 123678-HxCDD	86.4	
123789-HxCDD	ND	1.62			ES 123789-HxCDD	84.5	
1234678-HpCDD	ND	2.04			ES 1234678-HpCDD	94.1	
OCDD	ND	2.95			ES OCDD	113	
2378-TCDF	ND	1.88			ES 2378-TCDF	92.9	
12378-PeCDF	ND	1.36			ES 12378-PeCDF	91.9	
23478-PeCDF	ND	1.3			ES 23478-PeCDF	91.9	
123478-HxCDF	ND	0.782			ES 123478-HxCDF	88.1	
123678-HxCDF	ND	0.812			ES 123678-HxCDF	86.4	
234678-HxCDF	ND	0.894			ES 234678-HxCDF	87.8	
123789-HxCDF	ND	0.887			ES 123789-HxCDF	86.7	
1234678-HpCDF	ND	0.773			ES 1234678-HpCDF	88.8	
1234789-HpCDF	ND	0.844			ES 1234789-HpCDF	91.8	
OCDF	ND	1.33			ES OCDF	112	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	92.4	
Total TCDD	ND	1.87	ND		CS 12347-PeCDD	95.6	
Total PeCDD	ND	1.66	ND		CS 12346-PeCDF	90.9	
Total HxCDD	ND	1.72	ND		CS 123469-HxCDF	89	
Total HpCDD	ND	2.04	ND		CS 1234689-HpCDF	87.7	
Total TCDF	ND	1.88	ND				
Total PeCDF	ND	1.33	ND				
Total HxCDF	ND	0.841	ND				
Total HpCDF	ND	0.807	ND				
Total PCDD/Fs	**ND**		**ND**				
WHO-2005 TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	2.52	2.52	2.52				
TEQ: ND=DL	5.04	5.04	5.04				

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

METHOD 1613B **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_10122018_29OCT2018		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	190617R17	Analysis Date:	17-JUN-2019 22:12:49
Lab ID:	OPR1_16740_DF		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	11.1	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	50.6	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	54.1	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	56.6	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	51.4	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	52.9	35	-	70	Y
OCDD	100	111	78	-	144	Y
2,3,7,8-TCDF	10	10.2	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	50.4	40	-	67	Y
2,3,4,7,8-PeCDF	50	58	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	52.8	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	53.1	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	53.8	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	50.6	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	53.1	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	52.1	39	-	69	Y
OCDF	100	106	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 18 Jun 2019 09:56 Analyst: pw

METHOD 1613B **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_10122018_29OCT2018		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	190617R17	Analysis Date:	17-JUN-2019 22:12:49
Lab ID:	OPR1_16740_DF		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	95.5	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	92.6	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	90.1	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	85.4	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	89.3	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	97.3	26	-	166	Y
13C-OCDD	200	232	26	-	397	Y
13C-2,3,7,8-TCDF	100	94.9	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	94.6	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	97.6	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	86.6	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	85.4	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	86.7	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	88	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	90.2	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	92.6	20	-	186	Y
13C-OCDF	200	222	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	38.5	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 18 Jun 2019 09:56 Analyst: pw

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*07-May-19 at 09:44*
AP Project name:	*B3350*
Requested TAT:	*14 days*
Projected due date:	*18-Jun-19*
Matrix:	*Aqueous*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Nord Door*
Project PO#:	*108.00228.00059*
QAAP/Contract #:	*n/a*
Requested Analysis:	*Method 1613B*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
MW-16-0519	B3350_001	Water	1	1-Liter Amber	03-May-19	13:57	0.4	1	7870 8039 7271

Preservation Type: **Sample Seals:** No

Notes/Comments:

Analyze sample MW-16-0519 for D/Fs per client email.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Jay Burkamper *Logged in by: Ashley Owens* *QC'ed by:* AK 4 Jun 19

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B3256
*B3350

SGS

CHAIN OF CUSTODY

PROJECT INFO

PROJECT: Nord Door
P.O. #: 108.00228.00059
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard TAT
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

PRESERVATIVE

ANALYSIS & METHOD

SEND DOCUMENTATION / RESULTS TO

COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Road, Ste 440
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)

COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

	SAMPLE ID / DESCRIPTION	DATE	TIME	QTY	MATRIX	Dioxins/Furans	PCBs									MS MSD	MS/ DUP	REMARKS
1-2 001	MW-11A-0519	5/3/19	1537	2	water	X												
2 002	MW-11B-0519		1617	2														Hold
1 003	MW-12-0519		1120	2		X	X											
1-2 004	MW-13-0519			2		X	X											
1-2 005	MW-14-0519			2		X	X											
1 006	MW-15-0519			2			X											
2 007	MW-16-0519 *			2		X	X											
2 008	MW-17-0519	↓		2	↓	X	X											

Hold ALL ~~[illegible]~~ dioxin/Furans analysis pending soil results submitted last week.

COLLECTED/RELINQUISHED BY (1):	DATE: 5/6/19	TIME: 1300	RECEIVED BY:
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY (3):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: DATE: 5/7-19 TIME: 9:44
#1 · 0.3
#2 · 0.4
COOLER SEAL: ☒ INTACT ☐ BROKEN ☐ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☐ ABSENT
CARRIER: TEMP: °C 0.3° + 0.4°
TRACKING #:

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
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E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'Xx' denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

SGS CERTIFICATIONS

Alaska	17-012
Arkansas	18-042-0
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.1)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA031
Maine	2018018
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1535636
Mississippi	Reciprocity
Montana	0106
New Hampshire	208318 & 208518
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Vermont	VT-87634
Virginia	10101
Washington	C913
West Virginia	293

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Sample ID: MW-12-0519 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.96 L	Sample ID:	B3256_16680_PCB_003	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	8	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	EMPC		8.84	J	ES PCB-1	110
PCB-81 344'5-TeCB	ND	4.42			ES PCB-3	135
PCB-105 233'44'-PeCB	84.3				ES PCB-4	140
PCB-114 2344'5-PeCB	ND	2.34			ES PCB-15	161 V
PCB-118 23'44'5-PeCB	249				ES PCB-19	155 V
PCB-123 23'44'5'-PeCB	ND	2.32			ES PCB-37	90.2
PCB-126 33'44'5-PeCB	ND	2.08			ES PCB-54	84.5
PCB-156/157 233'44'5/233'44'5'-HxCB	EMPC		19	J C	ES PCB-77	91.8
PCB-167 23'44'55'-HxCB	6.71			J	ES PCB-81	91.5
PCB-169 33'44'55'-HxCB	ND	2.09			ES PCB-104	94
PCB-189 233'44'55'-HpCB	ND	1.92			ES PCB-105	103
					ES PCB-114	103
TEQs (WHO 2005 M/H)					ES PCB-118	101
					ES PCB-123	104
ND = 0	0.0102		0.0116		ES PCB-126	104
ND = 0.5 x DL	0.147		0.148		ES PCB-153	102
ND = DL	0.283		0.284		ES PCB-155	104
					ES PCB-156/157	119
Totals					ES PCB-167	110
Mono-CB	22.6				ES PCB-169	131
Di-CB	395		411		ES PCB-170	100
Tri-CB	1,960				ES PCB-180	96.1
Tetra-CB	2,480		2,560		ES PCB-188	98.7
Penta-CB	2,400		2,410		ES PCB-189	104
Hexa-CB	991		1,040		ES PCB-202	108
Hepta-CB	159		249		ES PCB-205	115
Octa-CB	100		108		ES PCB-206	128
Nona-CB	30.8				ES PCB-208	110
Deca-CB	ND	3.24			ES PCB-209	143
					CS PCB-28	96.3
Total PCB (Mono-Deca)	8,530		8,790		CS PCB-111	103
					CS PCB-178	102

Checkcode: 195-161-GPP/C SGS North America - PCB v0.83 Report Created: 24-May-2019 11:20 Analyst: ah

Sample ID: MW-12-0519 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.96 L	Sample ID:	B3256_16680_PCB_003	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	8	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	195-161-GPP/C	Time Analyzed:	16:15:33

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	22.6		PCB-19	72.2		PCB-54	(3.19)		PCB-72	(4.05)	
PCB-2	(3.81)		PCB-30/18	397	C	PCB-50/53	70.4	C	PCB-68	26.5	
PCB-3	(3.99)		PCB-17	232		PCB-45	60.1		PCB-57	(4.27)	
			PCB-27	35.6		PCB-51	66.3		PCB-58	(3.83)	
Conc.	22.6		PCB-24	(8.6)		PCB-46	[23.4]	EMPC	PCB-67	6.04	J
EMPC	22.6		PCB-16	172		PCB-52	531		PCB-63	[7.03]	J EMPC
			PCB-32	161		PCB-73	(3.27)		PCB-61/70/74/76	337	C
Di	**Conc.**	**Qualifiers**	PCB-34	(8.28)		PCB-43	9.51	J	PCB-66	187	
PCB-4	176		PCB-23	(8.36)		PCB-69/49	262	C	PCB-55	(3.89)	
PCB-10	6.6	J	PCB-26/29	51	C	PCB-48	58.1		PCB-56	82.5	
PCB-9	3.05	J	PCB-25	18.1		PCB-44/47/65	390	C	PCB-60	27.4	
PCB-7	3.14	J	PCB-31	245		PCB-59/62/75	[26.6]	J EMPC C	PCB-80	(4.04)	
PCB-6	18.3		PCB-28/20	318	C	PCB-42	96.7		PCB-79	(3.73)	
PCB-5	(3.08)		PCB-21/33	114	C	PCB-41	[10.8]	EMPC	PCB-78	(4.23)	
PCB-8	113		PCB-22	83.3		PCB-71/40	141	C	PCB-81	(4.42)	
PCB-14	(3)		PCB-36	(7.09)		PCB-64	127		PCB-77	[8.84]	J EMPC
PCB-11	[15.8]	B EMPC	PCB-39	(7.8)							
PCB-13/12	6.09	J C	PCB-38	(7.73)							
PCB-15	68.6		PCB-35	(8.07)							
			PCB-37	58.7							
Conc.	395		**Conc.**	1,960					**Conc.**	2,480	
EMPC	411		**EMPC**	1,960					**EMPC**	2,560	

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Totals	Conc.	EMPC
Mono-Tri	2,380	2,390
Tetra-Hexa	5,870	6,010
Hepta-Deca	290	387
Mono-Deca	8,530	8,790

Sample ID: MW-12-0519

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.75)		PCB-109/119/86/97/125/87	236	C	PCB-155	(1.44)		PCB-165	(1.85)	
PCB-96	[4.08]	J EMPC	PCB-117	6.07	J	PCB-152	(1.33)		PCB-146	30.7	
PCB-103	[5.19]	J EMPC	PCB-116/85	48.4	C	PCB-150	(1.51)		PCB-161	(1.61)	
PCB-94	(3.78)		PCB-110	435		PCB-136	40.6		PCB-153/168	182	C
PCB-95	391		PCB-115	(1.87)		PCB-145	(1.4)		PCB-141	39.8	
PCB-100/93	(3.37)	C	PCB-82	33.8		PCB-148	(2.22)		PCB-130	[17.4]	EMPC
PCB-102	13.5		PCB-111	(2.33)		PCB-151/135	77.7	C	PCB-137	10.2	J
PCB-98	(3.3)		PCB-120	(1.89)		PCB-154	(2.07)		PCB-164	17.3	
PCB-88	(3.64)		PCB-108/124	[6.6]	J EMPC C	PCB-144	(2.25)		PCB-163/138/129	241	C
PCB-91	73.9		PCB-107	17.5		PCB-147/149	199	C	PCB-160	(1.89)	
PCB-84	142		PCB-123	(2.32)		PCB-134	[13.5]	EMPC	PCB-158	24.6	
PCB-89	(3.16)		PCB-106	(2.18)		PCB-143	(2.36)		PCB-128/166	35.8	C
PCB-121	(2.11)		PCB-118	249		PCB-139/140	(2.1)	C	PCB-159	(1.56)	
PCB-92	77		PCB-122	(2.76)		PCB-131	(2.5)		PCB-162	(1.84)	
PCB-113/90/101	403	C	PCB-114	(2.34)		PCB-142	(2.49)		PCB-167	6.71	J
PCB-83	21.8		PCB-105	84.3		PCB-132	86.3		PCB-156/157	[19]	J EMPC C
PCB-99	167		PCB-127	(2.36)		PCB-133	(2.18)		PCB-169	(2.09)	
PCB-112	(1.92)		PCB-126	(2.08)							
			Conc.	2,400					**Conc.**	991	
			EMPC	2,410					**EMPC**	1,040	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.02)		PCB-174	33.2		PCB-202	[7.27]	J EMPC	PCB-208	(5.76)	
PCB-179	17.2		PCB-177	[14.5]	EMPC	PCB-201	(1.56)		PCB-207	(5.85)	
PCB-184	(1.02)		PCB-181	(2.51)		PCB-204	(1.35)		PCB-206	30.8	
PCB-176	[3.88]	J EMPC	PCB-171/173	[7.13]	J EMPC C	PCB-197	(1.47)				
PCB-186	(0.897)		PCB-172	(2.89)		PCB-200	(1.4)		**Conc.**	30.8	
PCB-178	10.5		PCB-192	(1.94)		PCB-198/199	39.2	C	**EMPC**	30.8	
PCB-175	(2.88)		PCB-180/193	[64.9]	EMPC C	PCB-196	13.4				
PCB-187	51		PCB-191	(2.22)		PCB-203	24.9		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.37)		PCB-170	26.3		PCB-195	(3.23)		PCB-209	(3.24)	
PCB-183	20.5		PCB-190	(2.33)		PCB-194	22.9				
PCB-185	(2.83)		PCB-189	(1.92)		PCB-205	(2.74)				
			Conc.	159		**Conc.**	100				
			EMPC	249		**EMPC**	108				

Sample ID: MW-13-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_004	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	8	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	19				ES PCB-1	87
PCB-81 344'5-TeCB	ND	4.41			ES PCB-3	94.5
PCB-105 233'44'-PeCB	182				ES PCB-4	104
PCB-114 2344'5-PeCB	EMPC		8.73	J	ES PCB-15	96.9
PCB-118 23'44'5-PeCB	535				ES PCB-19	105
PCB-123 23'44'5'-PeCB	7.99			J	ES PCB-37	102
PCB-126 33'44'5-PeCB	ND	1.26			ES PCB-54	97.4
PCB-156/157 233'44'5/233'44'5'-HxCB	81.6			C	ES PCB-77	97.9
PCB-167 23'44'55'-HxCB	29.8				ES PCB-81	96.3
PCB-169 33'44'55'-HxCB	ND	2.23			ES PCB-104	98.1
PCB-189 233'44'55'-HpCB	EMPC		5.94	J	ES PCB-105	109
					ES PCB-114	103
TEQs (WHO 2005 M/H)					ES PCB-118	103
					ES PCB-123	105
ND = 0	0.027		0.0274		ES PCB-126	105
ND = 0.5 x DL	0.124		0.125		ES PCB-153	106
ND = DL	0.221		0.222		ES PCB-155	104
					ES PCB-156/157	118
Totals					ES PCB-167	114
Mono-CB	24.5				ES PCB-169	132
Di-CB	1,240		1,260		ES PCB-170	97
Tri-CB	7,660				ES PCB-180	93.4
Tetra-CB	8,140		8,160		ES PCB-188	98.2
Penta-CB	6,370		6,420		ES PCB-189	102
Hexa-CB	4,120		4,140		ES PCB-202	107
Hepta-CB	1,590		1,590		ES PCB-205	112
Octa-CB	404		440		ES PCB-206	125
Nona-CB	78.1				ES PCB-208	107
Deca-CB			13.9		ES PCB-209	141
					CS PCB-28	101
Total PCB (Mono-Deca)	29,600		29,800		CS PCB-111	99.2
					CS PCB-178	102

Checkcode: 845-882-WBZ/C SGS North America - PCB v0.83 Report Created: 28-May-2019 10:40 Analyst: ah

Sample ID: MW-13-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_004	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	8	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	845-882-WBZ/C	Time Analyzed:	17:13:31

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	24.5		PCB-19	211		PCB-54	[3.57]	J EMPC	PCB-72	13.2	
PCB-2	(2.6)		PCB-30/18	1,420	C	PCB-50/53	334	C	PCB-68	19.9	
PCB-3	(2.72)		PCB-17	785		PCB-45	224		PCB-57	(4.26)	
			PCB-27	447		PCB-51	137		PCB-58	(3.82)	
Conc.	24.5		PCB-24	(4.68)		PCB-46	103		PCB-67	7.7	J
EMPC	24.5		PCB-16	90.1		PCB-52	2,160		PCB-63	[7.42]	J EMPC
			PCB-32	300		PCB-73	5.8	J	PCB-61/70/74/76	468	C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.77)		PCB-43	8.06	J	PCB-66	300	
PCB-4	365		PCB-23	(5.83)		PCB-69/49	1,470	C	PCB-55	(3.87)	
PCB-10	4.51	J	PCB-26/29	1,910	C	PCB-48	48.6		PCB-56	87.1	
PCB-9	[12.3]	EMPC	PCB-25	975		PCB-44/47/65	1,220	C	PCB-60	29.4	
PCB-7	[13.3]	EMPC	PCB-31	796		PCB-59/62/75	191	C	PCB-80	(4.03)	
PCB-6	649		PCB-28/20	574	C	PCB-42	217		PCB-79	(3.72)	
PCB-5	(2.16)		PCB-21/33	72	C	PCB-41	[8.92]	J EMPC	PCB-78	(4.22)	
PCB-8	117		PCB-22	45.3		PCB-71/40	537	C	PCB-81	(4.41)	
PCB-14	(2.1)		PCB-36	(4.94)		PCB-64	537		PCB-77	19	
PCB-11	44.1	B	PCB-39	(5.44)							
PCB-13/12	37.7	C	PCB-38	(5.39)							
PCB-15	19.5		PCB-35	(5.63)							
			PCB-37	30.8							
Conc.	1,240		**Conc.**	7,660					**Conc.**	8,140	
EMPC	1,260		**EMPC**	7,660					**EMPC**	8,160	

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Totals	**Conc.**	**EMPC**
Mono-Tri	8,920	8,950
Tetra-Hexa	18,600	18,700
Hepta-Deca	2,070	2,120
Mono-Deca	29,600	29,800

Sample ID: MW-13-0519 Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.05)		PCB-109/119/86/97/125/87	498	C	PCB-155	(0.918)		PCB-165	(1.04)	
PCB-96	20.8		PCB-117	[16.6]	EMPC	PCB-152	(0.845)		PCB-146	116	
PCB-103	24.5		PCB-116/85	116	C	PCB-150	(0.963)		PCB-161	(0.903)	
PCB-94	(5.68)		PCB-110	1,340		PCB-136	153		PCB-153/168	702	C
PCB-95	1,290		PCB-115	(2.8)		PCB-145	(0.889)		PCB-141	163	
PCB-100/93	[15.1]	J EMPC C	PCB-82	81.3		PCB-148	(1.24)		PCB-130	63.2	
PCB-102	42.9		PCB-111	(3.5)		PCB-151/135	310	C	PCB-137	43.3	
PCB-98	(4.95)		PCB-120	(2.83)		PCB-154	20.4		PCB-164	66.1	
PCB-88	(5.46)		PCB-108/124	19.2	J C	PCB-144	39.1		PCB-163/138/129	935	C
PCB-91	256		PCB-107	41.1		PCB-147/149	759	C	PCB-160	(1.06)	
PCB-84	437		PCB-123	7.99	J	PCB-134	53.3		PCB-158	87.5	
PCB-89	9.05	J	PCB-106	(3.28)		PCB-143	(1.32)		PCB-128/166	131	C
PCB-121	(3.17)		PCB-118	535		PCB-139/140	[15.9]	J EMPC C	PCB-159	(1.65)	
PCB-92	196		PCB-122	[8.46]	J EMPC	PCB-131	13.9		PCB-162	(1.95)	
PCB-113/90/101	860	C	PCB-114	[8.73]	J EMPC	PCB-142	(1.4)		PCB-167	29.8	
PCB-83	42.2		PCB-105	182		PCB-132	338		PCB-156/157	81.6	C
PCB-99	372		PCB-127	(3.08)		PCB-133	15.2		PCB-169	(2.23)	
PCB-112	(2.88)		PCB-126	(1.26)							
			Conc.	6,370					**Conc.**	4,120	
			EMPC	6,420					**EMPC**	4,140	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.802)		PCB-174	196		PCB-202	33.5		PCB-208	14.4	
PCB-179	90.8		PCB-177	106		PCB-201	[18.4]	EMPC	PCB-207	9.27	J
PCB-184	(0.807)		PCB-181	(2.59)		PCB-204	(1.22)		PCB-206	54.3	
PCB-176	32.8		PCB-171/173	57.5	C	PCB-197	[3.65]	J EMPC			
PCB-186	(0.708)		PCB-172	32.1		PCB-200	[14.9]	EMPC	**Conc.**	78.1	
PCB-178	51.2		PCB-192	(2)		PCB-198/199	123	C	**EMPC**	78.1	
PCB-175	8.37	J	PCB-180/193	401	C	PCB-196	56.5				
PCB-187	240		PCB-191	7.13	J	PCB-203	68.3		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.44)		PCB-170	188		PCB-195	34.1		PCB-209	[13.9]	EMPC
PCB-183	117		PCB-190	36.8		PCB-194	87.7				
PCB-185	20.6		PCB-189	[5.94]	J EMPC	PCB-205	(2.31)				
			Conc.	1,590		**Conc.**	404				
			EMPC	1,590		**EMPC**	440				

Sample ID: MW-14-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_005	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	7	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	EMPC		7.77	J	ES PCB-1	77.8
PCB-81 344'5-TeCB	ND	4.12			ES PCB-3	88.8
PCB-105 233'44'-PeCB	201				ES PCB-4	96.7
PCB-114 2344'5-PeCB	EMPC		8.27	J	ES PCB-15	99.7
PCB-118 23'44'5-PeCB	682				ES PCB-19	102
PCB-123 23'44'5'-PeCB	EMPC		5.82	J	ES PCB-37	90.3
PCB-126 33'44'5-PeCB	ND	1.72			ES PCB-54	83.1
PCB-156/157 233'44'5/233'44'5'-HxCB	74.2			C	ES PCB-77	90.2
PCB-167 23'44'55'-HxCB	22.4				ES PCB-81	91
PCB-169 33'44'55'-HxCB	ND	2.1			ES PCB-104	95.2
PCB-189 233'44'55'-HpCB	ND	2.32			ES PCB-105	102
					ES PCB-114	102
TEQs (WHO 2005 M/H)					ES PCB-118	102
					ES PCB-123	102
ND = 0	0.0294		0.0306		ES PCB-126	102
ND = 0.5 x DL	0.148		0.149		ES PCB-153	102
ND = DL	0.266		0.266		ES PCB-155	108
					ES PCB-156/157	117
Totals					ES PCB-167	115
Mono-CB	25.5				ES PCB-169	124
Di-CB	181				ES PCB-170	99.5
Tri-CB	1,210				ES PCB-180	96.3
Tetra-CB	4,030		4,100		ES PCB-188	98.6
Penta-CB	6,320		6,370		ES PCB-189	102
Hexa-CB	3,220		3,260		ES PCB-202	104
Hepta-CB	662		723		ES PCB-205	111
Octa-CB	186		200		ES PCB-206	127
Nona-CB	29.8		36.4		ES PCB-208	109
Deca-CB	ND	2.47			ES PCB-209	142
					CS PCB-28	96.1
Total PCB (Mono-Deca)	15,900		16,100		CS PCB-111	101
					CS PCB-178	98.6

Sample ID: MW-14-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_005	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	7	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	639-692-BRQ/C	Time Analyzed:	18:11:28

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	25.5		PCB-19	56.2		PCB-54	[5.17]	J EMPC	PCB-72	9.21	J
PCB-2	(2.42)		PCB-30/18	253	C	PCB-50/53	108	C	PCB-68	[10.2]	EMPC
PCB-3	(2.53)		PCB-17	127		PCB-45	55.8		PCB-57	(3.98)	
			PCB-27	23.2		PCB-51	95.6		PCB-58	(3.57)	
Conc.	25.5		PCB-24	(4.51)		PCB-46	34.7		PCB-67	(3.65)	
EMPC	25.5		PCB-16	79.4		PCB-52	1,060		PCB-63	[8.3]	J EMPC
			PCB-32	110		PCB-73	(1.98)		PCB-61/70/74/76	518	C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.37)		PCB-43	[7.02]	J EMPC	PCB-66	304	
PCB-4	71.6		PCB-23	(5.43)		PCB-69/49	550	C	PCB-55	(3.62)	
PCB-10	3.18	J	PCB-26/29	61.3	C	PCB-48	46.6		PCB-56	74.9	
PCB-9	1.86	J	PCB-25	27.3		PCB-44/47/65	658	C	PCB-60	[17.3]	EMPC
PCB-7	3.71	J	PCB-31	154		PCB-59/62/75	32.1	C	PCB-80	(3.77)	
PCB-6	18.3		PCB-28/20	200	C	PCB-42	141		PCB-79	[5.17]	J EMPC
PCB-5	(2.5)		PCB-21/33	57	C	PCB-41	7.28	J	PCB-78	(3.94)	
PCB-8	40.8		PCB-22	39.4		PCB-71/40	187	C	PCB-81	(4.12)	
PCB-14	(2.42)		PCB-36	(4.6)		PCB-64	154		PCB-77	[7.77]	J EMPC
PCB-11	17.6	B	PCB-39	(5.06)							
PCB-13/12	5	J C	PCB-38	(5.02)							
PCB-15	19		PCB-35	(5.24)							
			PCB-37	21.5							
Conc.	181		**Conc.**	1,210					**Conc.**	4,030	
EMPC	181		**EMPC**	1,210					**EMPC**	4,100	

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Totals	Conc.	EMPC
Mono-Tri	1,410	1,410
Tetra-Hexa	13,600	13,700
Hepta-Deca	877	959
Mono-Deca	15,900	16,100

Sample ID: MW-14-0519 Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.911)		PCB-109/119/86/97/125/87	553	C	PCB-155	(0.557)		PCB-165	(0.679)	
PCB-96	[5.85]	J EMPC	PCB-117	23.6		PCB-152	(0.513)		PCB-146	104	
PCB-103	17.6		PCB-116/85	108	C	PCB-150	[3.28]	J EMPC	PCB-161	(0.591)	
PCB-94	7.03	J	PCB-110	1,180		PCB-136	112		PCB-153/168	561	C
PCB-95	1,030		PCB-115	(1.73)		PCB-145	(0.539)		PCB-141	110	
PCB-100/93	14.5	J C	PCB-82	74.8		PCB-148	4.05	J	PCB-130	43.9	
PCB-102	30.9		PCB-111	(2.16)		PCB-151/135	237	C	PCB-137	32.3	
PCB-98	(3.05)		PCB-120	4.49	J	PCB-154	17.6		PCB-164	51.4	
PCB-88	(3.36)		PCB-108/124	[18.1]	J EMPC C	PCB-144	[22.1]	EMPC	PCB-163/138/129	731	C
PCB-91	179		PCB-107	56.1		PCB-147/149	586	C	PCB-160	(0.693)	
PCB-84	342		PCB-123	[5.82]	J EMPC	PCB-134	49.6		PCB-158	66.8	
PCB-89	7.94	J	PCB-106	(2.02)		PCB-143	(0.866)		PCB-128/166	108	C
PCB-121	(1.95)		PCB-118	682		PCB-139/140	[14.2]	J EMPC C	PCB-159	(1.32)	
PCB-92	213		PCB-122	[4.82]	J EMPC	PCB-131	11.1		PCB-162	(1.56)	
PCB-113/90/101	1,080	C	PCB-114	[8.27]	J EMPC	PCB-142	(0.916)		PCB-167	22.4	
PCB-83	64.4		PCB-105	201		PCB-132	278		PCB-156/157	74.2	C
PCB-99	464		PCB-127	(1.94)		PCB-133	15.8		PCB-169	(2.1)	
PCB-112	(1.77)		PCB-126	(1.72)							
			Conc.	6,320					**Conc.**	3,220	
			EMPC	6,370					**EMPC**	3,260	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.932)		PCB-174	87.3		PCB-202	[13.6]	EMPC	PCB-208	[6.61]	J EMPC
PCB-179	41.3		PCB-177	51.4		PCB-201	8.8	J	PCB-207	(4.67)	
PCB-184	(0.938)		PCB-181	(2.86)		PCB-204	(0.747)		PCB-206	29.8	
PCB-176	[13.6]	EMPC	PCB-171/173	27.2	C	PCB-197	(0.814)				
PCB-186	(0.823)		PCB-172	11.4		PCB-200	8.06	J	**Conc.**	29.8	
PCB-178	22.6		PCB-192	(2.21)		PCB-198/199	59.3	C	**EMPC**	36.4	
PCB-175	(3.28)		PCB-180/193	182	C	PCB-196	24.6				
PCB-187	120		PCB-191	(2.53)		PCB-203	33.8		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.69)		PCB-170	94.1		PCB-195	14.1		PCB-209	(2.47)	
PCB-183	[47.6]	EMPC	PCB-190	14.5		PCB-194	37.5				
PCB-185	8.94	J	PCB-189	(2.32)		PCB-205	(3.06)				
			Conc.	662		**Conc.**	186				
			EMPC	723		**EMPC**	200				

Sample ID: MW-15-0519 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	1.00 L	Sample ID:	B3256_16680_PCB_006	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	7	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	5.47			ES PCB-1	91
PCB-81 344'5-TeCB	ND	4.64			ES PCB-3	100
PCB-105 233'44'-PeCB	ND	1.96			ES PCB-4	105
PCB-114 2344'5-PeCB	ND	1.92			ES PCB-15	112
PCB-118 23'44'5-PeCB	EMPC		2.81	J	ES PCB-19	115
PCB-123 23'44'5'-PeCB	ND	2.04			ES PCB-37	85.8
PCB-126 33'44'5-PeCB	ND	2.32			ES PCB-54	78.9
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	2.54		C	ES PCB-77	89.2
PCB-167 23'44'55'-HxCB	ND	1.78			ES PCB-81	90.7
PCB-169 33'44'55'-HxCB	ND	2.12			ES PCB-104	95.1
PCB-189 233'44'55'-HpCB	ND	2.4			ES PCB-105	104
					ES PCB-114	103
TEQs (WHO 2005 M/H)					ES PCB-118	103
					ES PCB-123	104
ND = 0	0		0.0000844		ES PCB-126	98.4
ND = 0.5 x DL	0.149		0.149		ES PCB-153	104
ND = DL	0.298		0.298		ES PCB-155	99.9
					ES PCB-156/157	115
Totals					ES PCB-167	113
Mono-CB	ND	5.1			ES PCB-169	128
Di-CB			18.6		ES PCB-170	97.5
Tri-CB	ND	13.1			ES PCB-180	88.6
Tetra-CB	76.4		84.6		ES PCB-188	93.8
Penta-CB	4.68		12.8		ES PCB-189	97.8
Hexa-CB	3.99		9.33		ES PCB-202	102
Hepta-CB	ND	2.88			ES PCB-205	109
Octa-CB	ND	3.29			ES PCB-206	124
Nona-CB	ND	11.3			ES PCB-208	103
Deca-CB	ND	5.47			ES PCB-209	135
					CS PCB-28	85
Total PCB (Mono-Deca)	85.1		125		CS PCB-111	92
					CS PCB-178	90.7

Checkcode: 889-084-JKY/C SGS North America - PCB v0.83 Report Created: 24-May-2019 11:21 Analyst: ah

Sample ID: MW-15-0519

Method 1668C

Client Data

Name: SLR International Corp
Project ID: Nord Door
Date Collected: 03-May-2019

Sample Data

Matrix: Aqueous
Weight/Volume: 1.00 L
pH 7
Units pg/L

Laboratory Data

Project No.: B3256
Sample ID: B3256_16680_PCB_006
QC Batch No.: 16680
Checkcode: 889-084-JKY/C

Date Received: 07-May-2019
Date Extracted: 15-May-2019
Date Analyzed: 22-May-2019
Time Analyzed: 19:09:26

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(4.96)		PCB-19	(15.2)		PCB-54	(3.36)		PCB-72	(4.25)	
PCB-2	(5)		PCB-30/18	(10.8)	C	PCB-50/53	(4.31)	C	PCB-68	15.4	
PCB-3	(5.23)		PCB-17	(15.9)		PCB-45	(5.35)		PCB-57	(4.48)	
			PCB-27	(11.1)		PCB-51	42.4		PCB-58	(4.02)	
Conc.	0		PCB-24	(11.1)		PCB-46	(5.47)		PCB-67	(4.11)	
EMPC	0		PCB-16	(16.3)		PCB-52	[8.14]	J EMPC	PCB-63	(4.91)	
			PCB-32	(10.3)		PCB-73	(3.39)		PCB-61/70/74/76	(4.29)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(11.6)		PCB-43	(4.34)		PCB-66	(4.16)	
PCB-4	(5.29)		PCB-23	(11.7)		PCB-69/49	(3.87)	C	PCB-55	(4.08)	
PCB-10	(3.75)		PCB-26/29	(11.4)	C	PCB-48	(4.66)		PCB-56	(4.21)	
PCB-9	(1.86)		PCB-25	(9.71)		PCB-44/47/65	18.7	J C	PCB-60	(4.98)	
PCB-7	(2.07)		PCB-31	(9.88)		PCB-59/62/75	(3.49)	C	PCB-80	(4.24)	
PCB-6	(1.76)		PCB-28/20	(10.8)	C	PCB-42	(5.11)		PCB-79	(3.92)	
PCB-5	(2.14)		PCB-21/33	(11.1)	C	PCB-41	(6.06)		PCB-78	(4.44)	
PCB-8	(1.71)		PCB-22	(9.99)		PCB-71/40	(4.06)	C	PCB-81	(4.64)	
PCB-14	(2.08)		PCB-36	(9.9)		PCB-64	(3.49)		PCB-77	(5.47)	
PCB-11	[18.6]	B EMPC	PCB-39	(10.9)							
PCB-13/12	(2.08)	C	PCB-38	(10.8)							
PCB-15	(1.84)		PCB-35	(11.3)							
			PCB-37	(11)							
Conc.	0		**Conc.**	0					**Conc.**	76.4	
EMPC	18.6		**EMPC**	0					**EMPC**	84.6	

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Totals	Conc.	EMPC
Mono-Tri	0	18.6
Tetra-Hexa	85.1	107
Hepta-Deca	0	0
Mono-Deca	85.1	125

Sample ID: MW-15-0519 Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(2.19)		PCB-109/119/86/97/125/87	(2.3)	C	PCB-155	(1.73)		PCB-165	(1.94)	
PCB-96	(2.14)		PCB-117	(2.15)		PCB-152	(1.59)		PCB-146	(1.93)	
PCB-103	(2.73)		PCB-116/85	(2.41)	C	PCB-150	(1.81)		PCB-161	(1.7)	
PCB-94	(3.33)		PCB-110	4.68	J	PCB-136	(1.9)		PCB-153/168	3.99	J B C
PCB-95	(2.85)		PCB-115	(1.64)		PCB-145	(1.67)		PCB-141	(2.41)	
PCB-100/93	(2.96)	C	PCB-82	(2.89)		PCB-148	(2.33)		PCB-130	(2.85)	
PCB-102	(2.19)		PCB-111	(2.05)		PCB-151/135	(2.3)	C	PCB-137	(2.44)	
PCB-98	(2.9)		PCB-120	(1.66)		PCB-154	(2.18)		PCB-164	(1.68)	
PCB-88	(3.2)		PCB-108/124	(2)	C	PCB-144	(2.36)		PCB-163/138/129	(2.16)	C
PCB-91	(2.73)		PCB-107	(1.92)		PCB-147/149	[5.35]	J EMPC C	PCB-160	(1.99)	
PCB-84	(3.37)		PCB-123	(2.04)		PCB-134	(2.68)		PCB-158	(1.72)	
PCB-89	(2.79)		PCB-106	(1.92)		PCB-143	(2.48)		PCB-128/166	(1.98)	C
PCB-121	(1.86)		PCB-118	[2.81]	J EMPC	PCB-139/140	(2.2)	C	PCB-159	(1.51)	
PCB-92	(3)		PCB-122	(2.27)		PCB-131	(2.63)		PCB-162	(1.79)	
PCB-113/90/101	[5.26]	J EMPC C	PCB-114	(1.92)		PCB-142	(2.62)		PCB-167	(1.78)	
PCB-83	(3.59)		PCB-105	(1.96)		PCB-132	(2.53)		PCB-156/157	(2.54)	C
PCB-99	(2.16)		PCB-127	(1.8)		PCB-133	(2.3)		PCB-169	(2.12)	
PCB-112	(1.69)		PCB-126	(2.32)							
			Conc.	4.68					**Conc.**	3.99	
			EMPC	12.8					**EMPC**	9.33	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.4)		PCB-174	(3.63)		PCB-202	(2.02)		PCB-208	(7.16)	
PCB-179	(1.28)		PCB-177	(3.57)		PCB-201	(2.29)		PCB-207	(7.28)	
PCB-184	(1.41)		PCB-181	(3.37)		PCB-204	(1.98)		PCB-206	(15.5)	
PCB-176	(1.48)		PCB-171/173	(3.9)	C	PCB-197	(2.16)				
PCB-186	(1.24)		PCB-172	(3.88)		PCB-200	(2.06)		**Conc.**	0	
PCB-178	(1.96)		PCB-192	(2.6)		PCB-198/199	(2.55)	C	**EMPC**	0	
PCB-175	(3.86)		PCB-180/193	(3.15)	C	PCB-196	(2.92)				
PCB-187	(3.06)		PCB-191	(2.97)		PCB-203	(2.37)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(3.17)		PCB-170	(4.33)		PCB-195	(5.38)		PCB-209	(5.47)	
PCB-183	(3.44)		PCB-190	(3.07)		PCB-194	(5.19)				
PCB-185	(3.79)		PCB-189	(2.4)		PCB-205	(4.56)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

Sample ID: MW-16-0519 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.97 L	Sample ID:	B3256_16680_PCB_007	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	7	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	3.42			ES PCB-1	81.1
PCB-81 344'5-TeCB	ND	3.71			ES PCB-3	87.2
PCB-105 233'44'-PeCB	2.67			J	ES PCB-4	96.4
PCB-114 2344'5-PeCB	ND	0.904			ES PCB-15	93.7
PCB-118 23'44'5-PeCB	8.08			J	ES PCB-19	101
PCB-123 23'44'5'-PeCB	ND	0.922			ES PCB-37	87.4
PCB-126 33'44'5-PeCB	ND	1.32			ES PCB-54	75
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	1.97		C	ES PCB-77	91.2
PCB-167 23'44'55'-HxCB	ND	1.34			ES PCB-81	88.2
PCB-169 33'44'55'-HxCB	ND	1.64			ES PCB-104	93.2
PCB-189 233'44'55'-HpCB	ND	1.44			ES PCB-105	105
					ES PCB-114	100
TEQs (WHO 2005 M/H)					ES PCB-118	103
					ES PCB-123	101
ND = 0	0.000323		0.000323		ES PCB-126	101
ND = 0.5 x DL	0.0919		0.0919		ES PCB-153	101
ND = DL	0.183		0.183		ES PCB-155	96.5
					ES PCB-156/157	115
Totals					ES PCB-167	110
Mono-CB	ND	3.58			ES PCB-169	125
Di-CB	3.93		25.1		ES PCB-170	95.3
Tri-CB	ND	7.51			ES PCB-180	89.5
Tetra-CB	144				ES PCB-188	92.9
Penta-CB	33.6		65.8		ES PCB-189	99.1
Hexa-CB	26.9		39.3		ES PCB-202	106
Hepta-CB	12.1				ES PCB-205	108
Octa-CB	ND	1.82			ES PCB-206	125
Nona-CB	ND	9.08			ES PCB-208	104
Deca-CB	ND	3.32			ES PCB-209	136
					CS PCB-28	91.4
Total PCB (Mono-Deca)	221		286		CS PCB-111	99.4
					CS PCB-178	96.7

Sample ID: MW-16-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.97 L	Sample ID:	B3256_16680_PCB_007	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	7	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	475-800-MFB/C	Time Analyzed:	20:07:23

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(3.54)		PCB-19	(9.47)		PCB-54	(2.84)		PCB-72	(3.4)	
PCB-2	(3.46)		PCB-30/18	(6.75)	C	PCB-50/53	(3.77)	C	PCB-68	8.32	J
PCB-3	(3.62)		PCB-17	(9.95)		PCB-45	(4.68)		PCB-57	(3.59)	
			PCB-27	(6.92)		PCB-51	52.6		PCB-58	(3.22)	
Conc.	0		PCB-24	(6.95)		PCB-46	(4.78)		PCB-67	(3.29)	
EMPC	0		PCB-16	(10.1)		PCB-52	36.1		PCB-63	(3.93)	
			PCB-32	(6.4)		PCB-73	(2.96)		PCB-61/70/74/76	7.93	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.84)		PCB-43	(3.79)		PCB-66	(3.33)	
PCB-4	(2.12)		PCB-23	(5.9)		PCB-69/49	7.67	J C	PCB-55	(3.26)	
PCB-10	(1.5)		PCB-26/29	(5.76)	C	PCB-48	(4.08)		PCB-56	(3.37)	
PCB-9	3.93	J	PCB-25	(4.9)		PCB-44/47/65	31.5	C	PCB-60	(3.99)	
PCB-7	(1.66)		PCB-31	(4.99)		PCB-59/62/75	(3.05)	C	PCB-80	(3.39)	
PCB-6	(1.41)		PCB-28/20	(5.44)	C	PCB-42	(4.47)		PCB-79	(3.13)	
PCB-5	(1.72)		PCB-21/33	(5.6)	C	PCB-41	(5.29)		PCB-78	(3.55)	
PCB-8	(1.37)		PCB-22	(5.05)		PCB-71/40	(3.55)	C	PCB-81	(3.71)	
PCB-14	(1.67)		PCB-36	(5)		PCB-64	(3.05)		PCB-77	(3.42)	
PCB-11	[21.2]	B EMPC	PCB-39	(5.5)							
PCB-13/12	(1.67)	C	PCB-38	(5.45)							
PCB-15	(1.47)		PCB-35	(5.69)							
			PCB-37	(5.55)							
Conc.	3.93		**Conc.**	0					**Conc.**	144	
EMPC	25.1		**EMPC**	0					**EMPC**	144	

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Totals	**Conc.**	**EMPC**
Mono-Tri	3.93	25.1
Tetra-Hexa	205	249
Hepta-Deca	12.1	12.1
Mono-Deca	221	286

Sample ID: **MW-16-0519** **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.982)		PCB-109/119/86/97/125/87	7.26	J C	PCB-155	(0.841)		PCB-165	(0.948)	
PCB-96	(0.963)		PCB-117	(0.972)		PCB-152	(0.774)		PCB-146	(0.942)	
PCB-103	(1.23)		PCB-116/85	(1.09)	C	PCB-150	(0.881)		PCB-161	(0.826)	
PCB-94	(1.5)		PCB-110	12.8		PCB-136	3.41	J	PCB-153/168	[7.59]	J B EMPC C
PCB-95	[13.9]	EMPC	PCB-115	(0.743)		PCB-145	(0.814)		PCB-141	(1.17)	
PCB-100/93	(1.34)	C	PCB-82	(1.3)		PCB-148	(1.14)		PCB-130	(1.39)	
PCB-102	(0.99)		PCB-111	(0.928)		PCB-151/135	(1.12)	C	PCB-137	(1.19)	
PCB-98	(1.31)		PCB-120	(0.751)		PCB-154	(1.06)		PCB-164	(0.817)	
PCB-88	(1.45)		PCB-108/124	(0.903)	C	PCB-144	(1.15)		PCB-163/138/129	11.6	J B C
PCB-91	2.77	J	PCB-107	(0.866)		PCB-147/149	11.9	J C	PCB-160	(0.968)	
PCB-84	(1.52)		PCB-123	(0.922)		PCB-134	(1.31)		PCB-158	(0.837)	
PCB-89	(1.26)		PCB-106	(0.868)		PCB-143	(1.21)		PCB-128/166	(1.5)	C
PCB-121	(0.841)		PCB-118	8.08	J	PCB-139/140	(1.07)	C	PCB-159	(1.14)	
PCB-92	(1.36)		PCB-122	(1.07)		PCB-131	(1.28)		PCB-162	(1.35)	
PCB-113/90/101	[13.2]	J EMPC C	PCB-114	(0.904)		PCB-142	(1.28)		PCB-167	(1.34)	
PCB-83	(1.62)		PCB-105	2.67	J	PCB-132	[4.75]	J EMPC	PCB-156/157	(1.97)	C
PCB-99	[5.09]	J EMPC	PCB-127	(0.854)		PCB-133	(1.12)		PCB-169	(1.64)	
PCB-112	(0.763)		PCB-126	(1.32)							
			Conc.	33.6					**Conc.**	26.9	
			EMPC	65.8					**EMPC**	39.3	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.963)		PCB-174	(1.54)		PCB-202	(1.21)		PCB-208	(5.15)	
PCB-179	(0.877)		PCB-177	(1.52)		PCB-201	(1.37)		PCB-207	(5.24)	
PCB-184	(0.969)		PCB-181	(1.43)		PCB-204	(1.19)		PCB-206	(13)	
PCB-176	(1.02)		PCB-171/173	(1.66)	C	PCB-197	(1.29)				
PCB-186	(0.85)		PCB-172	(1.65)		PCB-200	(1.23)		**Conc.**	0	
PCB-178	(1.35)		PCB-192	(1.11)		PCB-198/199	(1.53)	C	**EMPC**	0	
PCB-175	(1.64)		PCB-180/193	4.52	J C	PCB-196	(1.75)				
PCB-187	4.23	J	PCB-191	(1.26)		PCB-203	(1.42)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.35)		PCB-170	3.36	J	PCB-195	(2.87)		PCB-209	(3.32)	
PCB-183	(1.46)		PCB-190	(1.27)		PCB-194	(2.77)				
PCB-185	(1.61)		PCB-189	(1.44)		PCB-205	(2.43)				
			Conc.	12.1		**Conc.**	0				
			EMPC	12.1		**EMPC**	0				

Sample ID: MW-17-0519 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_008	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	6	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	2.24			ES PCB-1	72.4
PCB-81 344'5-TeCB	ND	2.14			ES PCB-3	81.4
PCB-105 233'44'-PeCB	ND	0.802			ES PCB-4	90.1
PCB-114 2344'5-PeCB	ND	0.77			ES PCB-15	99.6
PCB-118 23'44'5-PeCB	EMPC		3	J	ES PCB-19	98.8
PCB-123 23'44'5'-PeCB	ND	0.788			ES PCB-37	82.3
PCB-126 33'44'5-PeCB	ND	0.578			ES PCB-54	80.2
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	1.08		C	ES PCB-77	87
PCB-167 23'44'55'-HxCB	ND	0.751			ES PCB-81	85.1
PCB-169 33'44'55'-HxCB	ND	0.888			ES PCB-104	87.7
PCB-189 233'44'55'-HpCB	ND	1.27			ES PCB-105	98.9
					ES PCB-114	95.6
TEQs (WHO 2005 M/H)					ES PCB-118	96
					ES PCB-123	97.2
ND = 0	0		0.00009		ES PCB-126	98.5
ND = 0.5 x DL	0.0428		0.0428		ES PCB-153	95.2
ND = DL	0.0855		0.0856		ES PCB-155	93
					ES PCB-156/157	109
Totals					ES PCB-167	103
Mono-CB	ND	2.2			ES PCB-169	119
Di-CB	14.9				ES PCB-170	92
Tri-CB	ND	4.34			ES PCB-180	85.8
Tetra-CB	120				ES PCB-188	86.6
Penta-CB	5.97		17.3		ES PCB-189	94.8
Hexa-CB	7.92		11.2		ES PCB-202	94.5
Hepta-CB	ND	1.3			ES PCB-205	107
Octa-CB	ND	1.17			ES PCB-206	120
Nona-CB	ND	5.21			ES PCB-208	101
Deca-CB	ND	1.7			ES PCB-209	137
					CS PCB-28	89
Total PCB (Mono-Deca)	149		164		CS PCB-111	96
					CS PCB-178	94.3

Checkcode: 168-688-PHF/C SGS North America - PCB v0.83 Report Created: 24-May-2019 11:21 Analyst: ah

Sample ID: MW-17-0519

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	07-May-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3256_16680_PCB_008	Date Extracted:	15-May-2019
Date Collected:	03-May-2019	pH	6	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	168-688-PHF/C	Time Analyzed:	21:05:19

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(2.21)		PCB-19	(5.05)		PCB-54	(1.69)		PCB-72	(1.96)	
PCB-2	(2.1)		PCB-30/18	(3.6)	C	PCB-50/53	(1.87)	C	PCB-68	23.5	
PCB-3	(2.19)		PCB-17	(5.31)		PCB-45	(2.33)		PCB-57	(2.07)	
			PCB-27	(3.69)		PCB-51	47.3		PCB-58	(1.86)	
Conc.	0		PCB-24	(3.71)		PCB-46	(2.38)		PCB-67	(1.9)	
EMPC	0		PCB-16	(5.41)		PCB-52	26.7		PCB-63	(2.27)	
			PCB-32	(3.42)		PCB-73	(1.47)		PCB-61/70/74/76	(1.98)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(3.82)		PCB-43	(1.88)		PCB-66	(1.92)	
PCB-4	(1.35)		PCB-23	(3.86)		PCB-69/49	(1.68)	C	PCB-55	(1.88)	
PCB-10	(0.954)		PCB-26/29	(3.77)	C	PCB-48	(2.03)		PCB-56	(1.94)	
PCB-9	(1.29)		PCB-25	(3.21)		PCB-44/47/65	22.8	J C	PCB-60	(2.3)	
PCB-7	(1.44)		PCB-31	(3.26)		PCB-59/62/75	(1.52)	C	PCB-80	(1.96)	
PCB-6	(1.23)		PCB-28/20	(3.56)	C	PCB-42	(2.22)		PCB-79	(1.81)	
PCB-5	(1.49)		PCB-21/33	(3.66)	C	PCB-41	(2.63)		PCB-78	(2.05)	
PCB-8	(1.19)		PCB-22	(3.3)		PCB-71/40	(1.77)	C	PCB-81	(2.14)	
PCB-14	(1.45)		PCB-36	(3.27)		PCB-64	(1.52)		PCB-77	(2.24)	
PCB-11	14.9	B	PCB-39	(3.6)							
PCB-13/12	(1.45)	C	PCB-38	(3.57)							
PCB-15	(1.28)		PCB-35	(3.72)							
			PCB-37	(3.63)							
Conc.	14.9		**Conc.**	0					**Conc.**	120	
EMPC	14.9		**EMPC**	0					**EMPC**	120	

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Totals	**Conc.**	**EMPC**
Mono-Tri	14.9	14.9
Tetra-Hexa	134	149
Hepta-Deca	0	0
Mono-Deca	149	164

Sample ID: MW-17-0519 Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.774)		PCB-109/119/86/97/125/87	(0.888)	C	PCB-155	(0.594)		PCB-165	(0.666)	
PCB-96	(0.759)		PCB-117	(0.83)		PCB-152	(0.546)		PCB-146	(0.662)	
PCB-103	(1.05)		PCB-116/85	[1.02]	J EMPC C	PCB-150	(0.622)		PCB-161	(0.58)	
PCB-94	(1.29)		PCB-110	[3.9]	J EMPC	PCB-136	(0.653)		PCB-153/168	3.61	J B C
PCB-95	[3.41]	J EMPC	PCB-115	(0.635)		PCB-145	(0.575)		PCB-141	(0.825)	
PCB-100/93	(1.14)	C	PCB-82	(1.11)		PCB-148	(0.798)		PCB-130	(0.977)	
PCB-102	(0.846)		PCB-111	(0.793)		PCB-151/135	(0.787)	C	PCB-137	(0.837)	
PCB-98	(1.12)		PCB-120	(0.642)		PCB-154	(0.746)		PCB-164	(0.574)	
PCB-88	(1.24)		PCB-108/124	(0.772)	C	PCB-144	(0.809)		PCB-163/138/129	[3.24]	J B EMPC C
PCB-91	(1.05)		PCB-107	(0.74)		PCB-147/149	4.32	J C	PCB-160	(0.68)	
PCB-84	(1.3)		PCB-123	(0.788)		PCB-134	(0.918)		PCB-158	(0.588)	
PCB-89	(1.08)		PCB-106	(0.742)		PCB-143	(0.85)		PCB-128/166	(0.837)	C
PCB-121	(0.718)		PCB-118	[3]	J EMPC	PCB-139/140	(0.755)	C	PCB-159	(0.639)	
PCB-92	(1.16)		PCB-122	(0.91)		PCB-131	(0.901)		PCB-162	(0.756)	
PCB-113/90/101	5.97	J C	PCB-114	(0.77)		PCB-142	(0.898)		PCB-167	(0.751)	
PCB-83	(1.38)		PCB-105	(0.802)		PCB-132	(0.867)		PCB-156/157	(1.08)	C
PCB-99	(0.835)		PCB-127	(0.734)		PCB-133	(0.786)		PCB-169	(0.888)	
PCB-112	(0.652)		PCB-126	(0.578)							
			Conc.	5.97					**Conc.**	7.92	
			EMPC	17.3					**EMPC**	11.2	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.631)		PCB-174	(1.54)		PCB-202	(0.566)		PCB-208	(3.32)	
PCB-179	(0.574)		PCB-177	(1.52)		PCB-201	(0.641)		PCB-207	(3.37)	
PCB-184	(0.635)		PCB-181	(1.43)		PCB-204	(0.555)		PCB-206	(7.11)	
PCB-176	(0.666)		PCB-171/173	(1.66)	C	PCB-197	(0.605)				
PCB-186	(0.557)		PCB-172	(1.65)		PCB-200	(0.576)		**Conc.**	0	
PCB-178	(0.885)		PCB-192	(1.11)		PCB-198/199	(0.716)	C	**EMPC**	0	
PCB-175	(1.64)		PCB-180/193	(1.34)	C	PCB-196	(0.818)				
PCB-187	(1.3)		PCB-191	(1.27)		PCB-203	(0.665)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.35)		PCB-170	(1.83)		PCB-195	(2.09)		PCB-209	(1.7)	
PCB-183	(1.46)		PCB-190	(1.3)		PCB-194	(2.01)				
PCB-185	(1.61)		PCB-189	(1.27)		PCB-205	(1.77)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

Sample ID: Method Blank B3256_16680 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**		
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Sample ID:	MB1_16680_PCB_TLX	Date Extracted:	15-May-2019
Date Collected:	n/a	pH	n/a	QC Batch No.:	16680	Date Analyzed:	22-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	2.84			ES PCB-1	71.5
PCB-81 344'5-TeCB	ND	2.67			ES PCB-3	83.3
PCB-105 233'44'-PeCB	ND	1.84			ES PCB-4	88.1
PCB-114 2344'5-PeCB	ND	1.86			ES PCB-15	95.7
PCB-118 23'44'5-PeCB	ND	1.73			ES PCB-19	92.7
PCB-123 23'44'5'-PeCB	ND	1.77			ES PCB-37	85.3
PCB-126 33'44'5-PeCB	ND	1.52			ES PCB-54	79.1
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	2.28		C	ES PCB-77	83.6
PCB-167 23'44'55'-HxCB	ND	1.54			ES PCB-81	83.6
PCB-169 33'44'55'-HxCB	ND	1.72			ES PCB-104	91.4
PCB-189 233'44'55'-HpCB	ND	2.02			ES PCB-105	100
					ES PCB-114	96
TEQs (WHO 2005 M/H)					ES PCB-118	97.1
					ES PCB-123	100
ND = 0	0		0		ES PCB-126	98.4
ND = 0.5 x DL	0.102		0.102		ES PCB-153	97.4
ND = DL	0.205		0.205		ES PCB-155	95.9
					ES PCB-156/157	112
Totals					ES PCB-167	104
Mono-CB	ND	3.83			ES PCB-169	126
Di-CB			10.2		ES PCB-170	91.6
Tri-CB	ND	5.12			ES PCB-180	87.6
Tetra-CB	ND	3.02			ES PCB-188	90.6
Penta-CB	ND	1.68			ES PCB-189	96.2
Hexa-CB	2.84		5.61		ES PCB-202	104
Hepta-CB	ND	1.87			ES PCB-205	107
Octa-CB	ND	2.04			ES PCB-206	120
Nona-CB	ND	9.36			ES PCB-208	100
Deca-CB	ND	2.4			ES PCB-209	133
					CS PCB-28	91.6
Total PCB (Mono-Deca)	2.84		15.8		CS PCB-111	94.1
					CS PCB-178	91.8

Checkcode: 825-219-LLL/C SGS North America - PCB v0.83 Report Created: 24-May-2019 11:20 Analyst: ah

Sample ID: Method Blank B3256_16680

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3256	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Sample ID:	MB1_16680_PCB_TLX	Date Extracted:	15-May-2019
Date Collected:	n/a	pH	n/a	QC Batch No.:	16680	Date Analyzed:	22-May-2019
		Units	pg/L	Checkcode:	825-219-LLL/C	Time Analyzed:	15:17:36

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(3.92)		PCB-19	(6.29)		PCB-54	(2.8)		PCB-72	(2.45)	
PCB-2	(3.58)		PCB-30/18	(4.48)	C	PCB-50/53	(3.55)	C	PCB-68	(2.6)	
PCB-3	(3.75)		PCB-17	(6.61)		PCB-45	(4.41)		PCB-57	(2.58)	
			PCB-27	(4.6)		PCB-51	(3.49)		PCB-58	(2.32)	
Conc.	0		PCB-24	(4.61)		PCB-46	(4.5)		PCB-67	(2.37)	
EMPC	0		PCB-16	(6.74)		PCB-52	(3.25)		PCB-63	(2.83)	
			PCB-32	(4.25)		PCB-73	(2.79)		PCB-61/70/74/76	(2.47)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(4.16)		PCB-43	(3.57)		PCB-66	(2.39)	
PCB-4	(3.12)		PCB-23	(4.2)		PCB-69/49	(3.19)	C	PCB-55	(2.35)	
PCB-10	(2.21)		PCB-26/29	(4.1)	C	PCB-48	(3.84)		PCB-56	(2.42)	
PCB-9	(3.22)		PCB-25	(3.49)		PCB-44/47/65	(3.31)	C	PCB-60	(2.87)	
PCB-7	(3.59)		PCB-31	(3.56)		PCB-59/62/75	(2.87)	C	PCB-80	(2.44)	
PCB-6	(3.05)		PCB-28/20	(3.88)	C	PCB-42	(4.21)		PCB-79	(2.26)	
PCB-5	(3.72)		PCB-21/33	(3.99)	C	PCB-41	(4.98)		PCB-78	(2.56)	
PCB-8	(2.97)		PCB-22	(3.59)		PCB-71/40	(3.35)	C	PCB-81	(2.67)	
PCB-14	(3.61)		PCB-36	(3.56)		PCB-64	(2.88)		PCB-77	(2.84)	
PCB-11	[10.2]	EMPC	PCB-39	(3.92)							
PCB-13/12	(3.61)	C	PCB-38	(3.89)							
PCB-15	(3.19)		PCB-35	(4.06)							
			PCB-37	(3.95)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	10.2		**EMPC**	0					**EMPC**	0	

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www.us.sgs.com

Totals	Conc.	EMPC
Mono-Tri	0	10.2
Tetra-Hexa	2.84	5.61
Hepta-Deca	0	0
Mono-Deca	2.84	15.8

Sample ID: Method Blank B3256_16680 **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.36)		PCB-109/119/86/97/125/87	(2)	C	PCB-155	(1.2)		PCB-165	(1.36)	
PCB-96	(1.34)		PCB-117	(1.87)		PCB-152	(1.11)		PCB-146	(1.35)	
PCB-103	(2.37)		PCB-116/85	(2.09)	C	PCB-150	(1.26)		PCB-161	(1.19)	
PCB-94	(2.89)		PCB-110	(1.71)		PCB-136	(1.32)		PCB-153/168	2.84	J C
PCB-95	(2.47)		PCB-115	(1.43)		PCB-145	(1.17)		PCB-141	(1.69)	
PCB-100/93	(2.57)	C	PCB-82	(2.51)		PCB-148	(1.63)		PCB-130	(2)	
PCB-102	(1.9)		PCB-111	(1.78)		PCB-151/135	(1.61)	C	PCB-137	(1.71)	
PCB-98	(2.52)		PCB-120	(1.44)		PCB-154	(1.53)		PCB-164	(1.17)	
PCB-88	(2.78)		PCB-108/124	(1.74)	C	PCB-144	(1.65)		PCB-163/138/129	[2.77]	J EMPC C
PCB-91	(2.37)		PCB-107	(1.66)		PCB-147/149	(1.48)	C	PCB-160	(1.39)	
PCB-84	(2.92)		PCB-123	(1.77)		PCB-134	(1.88)		PCB-158	(1.2)	
PCB-89	(2.42)		PCB-106	(1.67)		PCB-143	(1.74)		PCB-128/166	(1.72)	C
PCB-121	(1.62)		PCB-118	(1.73)		PCB-139/140	(1.54)	C	PCB-159	(1.31)	
PCB-92	(2.61)		PCB-122	(2.2)		PCB-131	(1.84)		PCB-162	(1.55)	
PCB-113/90/101	(2.18)	C	PCB-114	(1.86)		PCB-142	(1.84)		PCB-167	(1.54)	
PCB-83	(3.11)		PCB-105	(1.84)		PCB-132	(1.77)		PCB-156/157	(2.28)	C
PCB-99	(1.88)		PCB-127	(1.69)		PCB-133	(1.61)		PCB-169	(1.72)	
PCB-112	(1.47)		PCB-126	(1.52)							
			Conc.	0					**Conc.**	2.84	
			EMPC	0					**EMPC**	5.61	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.37)		PCB-174	(1.93)		PCB-202	(1.35)		PCB-208	(5.64)	
PCB-179	(1.24)		PCB-177	(1.9)		PCB-201	(1.53)		PCB-207	(5.73)	
PCB-184	(1.38)		PCB-181	(1.79)		PCB-204	(1.32)		PCB-206	(13.1)	
PCB-176	(1.44)		PCB-171/173	(2.07)	C	PCB-197	(1.44)				
PCB-186	(1.21)		PCB-172	(2.06)		PCB-200	(1.37)		**Conc.**	0	
PCB-178	(1.92)		PCB-192	(1.38)		PCB-198/199	(1.71)	C	**EMPC**	0	
PCB-175	(2.05)		PCB-180/193	(1.68)	C	PCB-196	(1.95)				
PCB-187	(1.63)		PCB-191	(1.58)		PCB-203	(1.58)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.68)		PCB-170	(2.49)		PCB-195	(3.23)		PCB-209	(2.4)	
PCB-183	(1.83)		PCB-190	(1.76)		PCB-194	(3.11)				
PCB-185	(2.01)		PCB-189	(2.02)		PCB-205	(2.73)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM4_PCB_08292018_04Jan2019		
Instrument ID:	MM4	GC Column ID:	
VER Data Filename:	190522S03	Analysis Date:	22-MAY-2019 14:19:38
Lab ID:	OPR1_16680_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	109	60	-	135	Y
PCB-3 4-MoCB	50	107	60	-	135	Y
PCB-4 22'-DiCB	50	113	60	-	135	Y
PCB-15 44'-DiCB	50	101	60	-	135	Y
PCB-19 22'6-TrCB	50	108	60	-	135	Y
PCB-37 344'-TrCB	50	103	60	-	135	Y
PCB-54 22'66'-TeCB	50	103	60	-	135	Y
PCB-77 33'44'-TeCB	50	101	60	-	135	Y
PCB-81 344'5-TeCB	50	91.2	60	-	135	Y
PCB-104 22'466'-PeCB	50	93.3	60	-	135	Y
PCB-105 233'44'-PeCB	50	101	60	-	135	Y
PCB-114 2344'5-PeCB	50	95.2	60	-	135	Y
PCB-118 23'44'5-PeCB	50	95.9	60	-	135	Y
PCB-123 23'44'5'-PeCB	50	94	60	-	135	Y
PCB-126 33'44'5-PeCB	50	111	60	-	135	Y
PCB-155 22'44'66'-HxCB	50	90.4	60	-	135	Y
PCB-156/157 ...-HxCB	100	96.8	60	-	135	Y
PCB-167 23'44'55'-HxCB	50	98.5	60	-	135	Y
PCB-169 33'44'55'-HxCB	50	105	60	-	135	Y
PCB-188 22'34'566'-HpCB	50	102	60	-	135	Y
PCB-189 233'44'55'-HpCB	50	94.8	60	-	135	Y
PCB-202 22'33'55'66'-OcCB	50	99.4	60	-	135	Y
PCB-205 233'44'55'6-OcCB	50	100	60	-	135	Y
PCB-206 22'33'44'55'6-NoCB	50	110	60	-	135	Y
PCB-208 22'33'455'66'-NoCB	50	98.9	60	-	135	Y
PCB-209 DeCB	50	90.1	60	-	135	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668C.

Processed: 24 May 2019 11:19 Analyst: ah

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_08292018_04Jan2019
Instrument ID: MM4 GC Column ID:
VER Data Filename: 190522S03 Analysis Date: 22-MAY-2019 14:19:38
Lab ID: OPR1_16680_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	65.5	15	-	145	Y
ES PCB-3	100	77.8	15	-	145	Y
ES PCB-4	100	83.3	15	-	145	Y
ES PCB-15	100	96.3	15	-	145	Y
ES PCB-19	100	96.6	15	-	145	Y
ES PCB-37	100	84.9	15	-	145	Y
ES PCB-54	100	73	15	-	145	Y
ES PCB-77	100	90	40	-	145	Y
ES PCB-81	100	88.2	40	-	145	Y
ES PCB-104	100	90.4	40	-	145	Y
ES PCB-105	100	104	40	-	145	Y
ES PCB-114	100	101	40	-	145	Y
ES PCB-118	100	101	40	-	145	Y
ES PCB-123	100	102	40	-	145	Y
ES PCB-126	100	106	40	-	145	Y
ES PCB-153	100	102	40	-	145	Y
ES PCB-155	100	94.1	40	-	145	Y
ES PCB-156/157	200	120	40	-	145	Y
ES PCB-167	100	113	40	-	145	Y
ES PCB-169	100	136	40	-	145	Y
ES PCB-170	100	99.1	40	-	145	Y
ES PCB-180	100	90.7	40	-	145	Y
ES PCB-188	100	92.4	40	-	145	Y
ES PCB-189	100	101	40	-	145	Y
ES PCB-202	100	102	40	-	145	Y
ES PCB-205	100	111	40	-	145	Y
ES PCB-206	100	124	40	-	145	Y
ES PCB-208	100	105	40	-	145	Y
ES PCB-209	100	141	40	-	145	Y
CLEANUP STANDARDS						
CS PCB-28	100	89.8	15	-	145	Y
CS PCB-111	100	100	40	-	145	Y
CS PCB-178	100	97.6	40	-	145	Y

Processed: 24 May 2019 11:19 Analyst: ah

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*07-May-19 at 09:44*
AP Project name:	*B3256*
Requested TAT:	*21 days*
Projected due date:	*28-May-19*
Matrix:	*Aqueous*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Nord Door*
Project PO#:	*108.00228.00059*
QAAP/Contract #:	*n/a*
Requested Analysis:	*Method 1668C*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
MW-11A-0519	B3256_001	water - D/F	2	1L amber	03-May-19	15:37	0.3, 0.4	1, 2	787080397260,787080397271,
MW-11B-0519	B3256_002	water - HOLD	2	1L amber	03-May-19	16:17	0.4	2	787080397271
MW-12-0519	B3256_003	water - D/F & PCB	2	1L amber	03-May-19	11:20	0.3	1	787080397260
MW-13-0519	B3256_004	water - D/F & PCB	2	1L amber	03-May-19	00:00	0.3, 0.4	1, 2	787080397260,787080397271,
MW-14-0519	B3256_005	water - D/F & PCB	2	1L amber	03-May-19	00:00	0.3, 0.4	1, 2	787080397260,787080397271,
MW-15-0519	B3256_006	water - PCB	2	1L amber	03-May-19	00:00	0.3	1	787080397260
MW-16-0519	B3256_007	water - D/F & PCB	2	1L amber	03-May-19	00:00	0.4	2	787080397271
MW-17-0519	B3256_008	water - D/F & PCB	2	1L amber	03-May-19	00:00	0.4	2	787080397271

Preservation Type: **Sample Seals:** No

Notes/Comments:

*Hold all D/F analysis pending soil results.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Jay Burkamper *Logged in by: Jay Burkamper* *QC'ed by:* AK 7 May 19

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B3256

SGS

CHAIN OF CUSTODY

PROJECT INFO
PROJECT: Nord Door
P.O. #: 108.00228.00059
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard TAT
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

SEND DOCUMENTATION / RESULTS TO
COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Road, Ste 440
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

PRESERVATIVE

ANALYSIS & METHOD

SAMPLE ID / DESCRIPTION	DATE	TIME	QTY	MATRIX	Dioxins/Furans	PCBs								MS MSD	MS/ DUP	REMARKS
1+2 001 MW-11A-0519	5/3/19	1537	2	water	X											
2 002 MW-11B-0519	↓	1617	2	↓												Hold
1 003 MW-12-0519		1120	2		X	X										
1-2 004 MW-13-0519			2		X	X										
1-2 005 MW-14-0519			2		X	X										
1 006 MW-15-0519			2			X										
2 007 MW-16-0519			2		X	X										
2 008 MW-17-0519			2		X	X										

Hold ALL ~~[illegible]~~ dioxin/Furans analysis pending soil results submitted last week.

COLLECTED/RELINQUISHED BY (1):	DATE: 5/6/19	TIME: 1300	RECEIVED BY:
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY (3):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: DATE: 5/7/19 TIME: 9:44
#1 · 0.3
#2 · 0.4
COOLER SEAL: ☒ INTACT ☐ BROKEN ☐ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☐ ABSENT
CARRIER: TEMP: °C 0.3° + 0.4°
TRACKING #:

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. ‘Xx’ denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the “D” indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the “S” indicates the split factor.

SGS CERTIFICATIONS

Alaska	17-012
Arkansas	18-042-0
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.1)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA031
Maine	2018018
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1535636
Mississippi	Reciprocity
Montana	0106
New Hampshire	208318 & 208518
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Vermont	VT-87634
Virginia	10101
Washington	C913
West Virginia	293

Rev. 06-Mar-2019

Sample ID: GP-801-GW

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3246_16671_PCB_001	Date Extracted:	08-May-2019
Date Collected:	26-Apr-2019	pH	6	QC Batch No.:	16671	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier
	pg/L	pg/L	pg/L	
PCB-77 33'44'-TeCB	39.4			
PCB-81 344'5-TeCB	ND	4.46		
PCB-105 233'44'-PeCB	28.9			
PCB-114 2344'5-PeCB	EMPC		3.52	J
PCB-118 23'44'5-PeCB	91.9			
PCB-123 23'44'5'-PeCB	EMPC		2.39	J
PCB-126 33'44'5-PeCB	2.94			J
PCB-156/157 233'44'5/233'44'5'-HxCB	13.4			J C
PCB-167 23'44'55'-HxCB	5.78			J
PCB-169 33'44'55'-HxCB	3.03			J
PCB-189 233'44'55'-HpCB	ND	2.6		
TEQs (WHO 2005 M/H)				
ND = 0	0.393		0.393	
ND = 0.5 x DL	0.393		0.394	
ND = DL	0.394		0.394	
Totals				
Mono-CB	91.5			
Di-CB	2,230			
Tri-CB	9,330		9,340	
Tetra-CB	4,530		4,570	
Penta-CB	754		865	
Hexa-CB	371		384	
Hepta-CB	58.1		91.3	
Octa-CB	27.5		33.5	
Nona-CB	ND	10.6		
Deca-CB	ND	4.1		
Total PCB (Mono-Deca)	17,400		17,600	

Standard	Recovery
	%
ES PCB-1	70.7
ES PCB-3	77.4
ES PCB-4	86.4
ES PCB-15	83.7
ES PCB-19	88.5
ES PCB-37	84.8
ES PCB-54	83.9
ES PCB-77	81.1
ES PCB-81	80
ES PCB-104	94.8
ES PCB-105	98.8
ES PCB-114	95.4
ES PCB-118	95.7
ES PCB-123	98
ES PCB-126	96.1
ES PCB-153	97.3
ES PCB-155	101
ES PCB-156/157	112
ES PCB-167	105
ES PCB-169	122
ES PCB-170	90.8
ES PCB-180	86.6
ES PCB-188	95.9
ES PCB-189	95.3
ES PCB-202	103
ES PCB-205	108
ES PCB-206	118
ES PCB-208	98.5
ES PCB-209	129
CS PCB-28	90.5
CS PCB-111	95.7
CS PCB-178	98.7

Checkcode: 920-749-YNB/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: MS

Sample ID: GP-801-GW

Method 1668C

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	0.98 L	Sample ID:	B3246_16671_PCB_001	Date Extracted:	08-May-2019
Date Collected:	26-Apr-2019	pH	6	QC Batch No.:	16671	Date Analyzed:	20-May-2019
		Units	pg/L	Checkcode:	920-749-YNB/C	Time Analyzed:	18:58:40

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	32.1		PCB-19	177		PCB-54	[2.9]	J EMPC	PCB-72	8.93	J
PCB-2	25.2		PCB-30/18	1,430	C	PCB-50/53	132	C	PCB-68	[16.1]	EMPC
PCB-3	34.2		PCB-17	845		PCB-45	189		PCB-57	[4.43]	J EMPC
			PCB-27	114		PCB-51	95.7		PCB-58	(3.67)	
Conc.	91.5		PCB-24	23.2		PCB-46	71.8		PCB-67	[19.6]	EMPC
EMPC	91.5		PCB-16	740		PCB-52	580		PCB-63	23.5	
			PCB-32	449		PCB-73	(3.15)		PCB-61/70/74/76	537	C
Di	**Conc.**	**Qualifiers**	PCB-34	[16.9]	EMPC	PCB-43	28.8		PCB-66	304	
PCB-4	357		PCB-23	(5.96)		PCB-69/49	466	C	PCB-55	[3.91]	J EMPC
PCB-10	10.8		PCB-26/29	628	C	PCB-48	121		PCB-56	138	
PCB-9	32.3		PCB-25	341		PCB-44/47/65	715	C	PCB-60	37.4	
PCB-7	25.4		PCB-31	1,390		PCB-59/62/75	97.2	C	PCB-80	(3.92)	
PCB-6	778		PCB-28/20	1,880	C	PCB-42	241		PCB-79	(3.66)	
PCB-5	7.12	J	PCB-21/33	426	C	PCB-41	37.6		PCB-78	(4.18)	
PCB-8	674		PCB-22	547		PCB-71/40	342	C	PCB-81	(4.46)	
PCB-14	(2.22)		PCB-36	(5.06)		PCB-64	319		PCB-77	39.4	
PCB-11	29.6	B	PCB-39	(5.6)							
PCB-13/12	79.3	C	PCB-38	(5.55)							
PCB-15	234		PCB-35	7.51	J						
			PCB-37	334							
Conc.	2,230		**Conc.**	9,330					**Conc.**	4,530	
EMPC	2,230		**EMPC**	9,340					**EMPC**	4,570	

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Totals	Conc.	EMPC
Mono-Tri	11,600	11,700
Tetra-Hexa	5,650	5,820
Hepta-Deca	85.5	125
Mono-Deca	17,400	17,600

Sample ID: **GP-801-GW** **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.43)		PCB-109/119/86/97/125/87	88.8	C	PCB-155	(1.05)		PCB-165	1.47	J
PCB-96	3.6	J	PCB-117	[4.42]	J EMPC	PCB-152	(0.987)		PCB-146	14.5	
PCB-103	(3.39)		PCB-116/85	23.1	C	PCB-150	(1.12)		PCB-161	(0.961)	
PCB-94	(4.13)		PCB-110	132		PCB-136	11.4		PCB-153/168	76.4	C
PCB-95	129		PCB-115	(2.46)		PCB-145	(1.04)		PCB-141	12.1	
PCB-100/93	(3.68)	C	PCB-82	16.3		PCB-148	(1.35)		PCB-130	6.38	J
PCB-102	[5.12]	J EMPC	PCB-111	(2.61)		PCB-151/135	25.7	C	PCB-137	6.31	J
PCB-98	(3.69)		PCB-120	[1.9]	J EMPC	PCB-154	3.49	J	PCB-164	5.51	J
PCB-88	(3.89)		PCB-108/124	5.6	J C	PCB-144	[1.94]	J EMPC	PCB-163/138/129	78.9	C
PCB-91	32		PCB-107	[8.37]	J EMPC	PCB-147/149	59.9	C	PCB-160	(1.1)	
PCB-84	[50.2]	EMPC	PCB-123	[2.39]	J EMPC	PCB-134	[4.34]	J EMPC	PCB-158	[6.46]	J EMPC
PCB-89	[4.98]	J EMPC	PCB-106	(2.4)		PCB-143	(1.41)		PCB-128/166	14.5	J C
PCB-121	(2.36)		PCB-118	91.9		PCB-139/140	4.2	J C	PCB-159	(1.3)	
PCB-92	[30.3]	EMPC	PCB-122	(2.9)		PCB-131	(1.5)		PCB-162	(1.51)	
PCB-113/90/101	132	C	PCB-114	[3.52]	J EMPC	PCB-142	(1.53)		PCB-167	5.78	J
PCB-83	11.7		PCB-105	28.9		PCB-132	28.4		PCB-156/157	13.4	J C
PCB-99	56.5		PCB-127	(2.27)		PCB-133	(1.34)		PCB-169	3.03	J
PCB-112	(2.29)		PCB-126	2.94	J						
			Conc.	754					**Conc.**	371	
			EMPC	865					**EMPC**	384	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.5)		PCB-174	11.2		PCB-202	2.94	J	PCB-208	(6.39)	
PCB-179	[5.31]	J EMPC	PCB-177	5.08	J	PCB-201	[1.4]	J EMPC	PCB-207	(6.54)	
PCB-184	(1.54)		PCB-181	(1.92)		PCB-204	(1.19)		PCB-206	(14.8)	
PCB-176	(1.65)		PCB-171/173	[4.35]	J EMPC C	PCB-197	(1.29)				
PCB-186	(1.36)		PCB-172	4.34	J	PCB-200	(1.27)		**Conc.**	0	
PCB-178	(2.16)		PCB-192	(1.49)		PCB-198/199	10.3	J C	**EMPC**	0	
PCB-175	(2.15)		PCB-180/193	23.9	C	PCB-196	[2.88]	J EMPC			
PCB-187	[13]	EMPC	PCB-191	(1.71)		PCB-203	7.49	J	**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.8)		PCB-170	13.6		PCB-195	[1.72]	J EMPC	PCB-209	(4.1)	
PCB-183	[6.82]	J EMPC	PCB-190	[2.44]	J EMPC	PCB-194	6.73	J			
PCB-185	[1.28]	J EMPC	PCB-189	(2.6)		PCB-205	(2.9)				
			Conc.	58.1		**Conc.**	27.5				
			EMPC	91.3		**EMPC**	33.5				

Sample ID: GP-802-GW

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	0.86 L	Sample ID:	B3246_16671_PCB_002	Date Extracted:	08-May-2019
Date Collected:	26-Apr-2019	pH	5	QC Batch No.:	16671	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	4.74			ES PCB-1	67.4
PCB-81 344'5-TeCB	ND	4.18			ES PCB-3	71.8
PCB-105 233'44'-PeCB	EMPC		1.27	J B	ES PCB-4	79.1
PCB-114 2344'5-PeCB	ND	1.99			ES PCB-15	82.4
PCB-118 23'44'5-PeCB	4.5			J B	ES PCB-19	82.4
PCB-123 23'44'5'-PeCB	ND	1.95			ES PCB-37	77.4
PCB-126 33'44'5-PeCB	ND	1.5			ES PCB-54	68.4
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	2.28		C	ES PCB-77	73.6
PCB-167 23'44'55'-HxCB	ND	1.53			ES PCB-81	75.8
PCB-169 33'44'55'-HxCB	ND	1.97			ES PCB-104	84.9
PCB-189 233'44'55'-HpCB	ND	2.46			ES PCB-105	93.8
					ES PCB-114	91.1
TEQs (WHO 2005 M/H)					ES PCB-118	91.9
					ES PCB-123	94.5
ND = 0	0.000135		0.000173		ES PCB-126	93.2
ND = 0.5 x DL	0.106		0.106		ES PCB-153	95.8
ND = DL	0.211		0.211		ES PCB-155	93.7
					ES PCB-156/157	109
Totals					ES PCB-167	104
Mono-CB	ND	4.6			ES PCB-169	120
Di-CB	2.31		24		ES PCB-170	86.8
Tri-CB	ND	8.21			ES PCB-180	83.9
Tetra-CB	102		115		ES PCB-188	92.1
Penta-CB	17		18.3		ES PCB-189	92.7
Hexa-CB	4.88		13.7		ES PCB-202	98.5
Hepta-CB	3.44				ES PCB-205	105
Octa-CB	ND	2.86			ES PCB-206	117
Nona-CB	ND	10.8			ES PCB-208	97.5
Deca-CB	ND	4.6			ES PCB-209	126
					CS PCB-28	82.5
Total PCB (Mono-Deca)	130		174		CS PCB-111	90.1
					CS PCB-178	97

Checkcode: 667-905-RKN/C

Sample ID: GP-802-GW

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	0.86 L	Sample ID:	B3246_16671_PCB_002	Date Extracted:	08-May-2019
Date Collected:	26-Apr-2019	pH	5	QC Batch No.:	16671	Date Analyzed:	20-May-2019
		Units	pg/L	Checkcode:	667-905-RKN/C	Time Analyzed:	19:56:07

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(4.37)		PCB-19	(9.65)		PCB-54	(3.28)		PCB-72	(3.6)	
PCB-2	(4.5)		PCB-30/18	(6.89)	C	PCB-50/53	(4.68)	C	PCB-68	[12.5]	EMPC
PCB-3	(4.83)		PCB-17	(10.1)		PCB-45	(5.65)		PCB-57	(3.85)	
			PCB-27	(7.2)		PCB-51	39.3		PCB-58	(3.44)	
Conc.	0		PCB-24	(6.99)		PCB-46	(5.91)		PCB-67	(3.51)	
EMPC	0		PCB-16	(10.4)		PCB-52	(4.22)		PCB-63	(4.21)	
			PCB-32	(6.52)		PCB-73	(3.59)		PCB-61/70/74/76	(3.72)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(7.01)		PCB-43	(4.56)		PCB-66	(3.59)	
PCB-4	(3.54)		PCB-23	(7.08)		PCB-69/49	(4.15)	C	PCB-55	(3.53)	
PCB-10	(2.62)		PCB-26/29	(6.94)	C	PCB-48	(4.96)		PCB-56	(3.71)	
PCB-9	(2.46)		PCB-25	(5.96)		PCB-44/47/65	63.1	C	PCB-60	(4.45)	
PCB-7	(2.74)		PCB-31	(6.13)		PCB-59/62/75	(3.72)	C	PCB-80	(3.67)	
PCB-6	(2.35)		PCB-28/20	(6.62)	C	PCB-42	(5.42)		PCB-79	(3.42)	
PCB-5	(2.82)		PCB-21/33	(6.79)	C	PCB-41	(6.13)		PCB-78	(3.92)	
PCB-8	2.31	J	PCB-22	(6.13)		PCB-71/40	(4.41)	C	PCB-81	(4.18)	
PCB-14	(2.76)		PCB-36	(6.01)		PCB-64	(3.69)		PCB-77	(4.74)	
PCB-11	[21.7]	B EMPC	PCB-39	(6.65)							
PCB-13/12	(2.73)	C	PCB-38	(6.59)							
PCB-15	(2.55)		PCB-35	(6.85)							
			PCB-37	(6.78)							
Conc.	2.31		**Conc.**	0					**Conc.**	102	
EMPC	24		**EMPC**	0					**EMPC**	115	

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Totals	**Conc.**	**EMPC**
Mono-Tri	2.31	24
Tetra-Hexa	124	147
Hepta-Deca	3.44	3.44
Mono-Deca	130	174

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Sample ID: GP-802-GW

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.55)		PCB-109/119/86/97/125/87	(2.15)	C	PCB-155	(1.29)		PCB-165	(1.4)	
PCB-96	(1.56)		PCB-117	(2.07)		PCB-152	(1.21)		PCB-146	(1.41)	
PCB-103	(2.51)		PCB-116/85	(2.21)	C	PCB-150	(1.38)		PCB-161	(1.19)	
PCB-94	(3.07)		PCB-110	4.82	J B	PCB-136	(1.45)		PCB-153/168	[4.97]	J B EMPC C
PCB-95	3.28	J B	PCB-115	(1.83)		PCB-145	(1.28)		PCB-141	(1.73)	
PCB-100/93	(2.73)	C	PCB-82	(2.71)		PCB-148	(1.66)		PCB-130	(2.03)	
PCB-102	(2.03)		PCB-111	(1.93)		PCB-151/135	(1.66)	C	PCB-137	(1.87)	
PCB-98	(2.74)		PCB-120	(1.57)		PCB-154	(1.57)		PCB-164	(1.15)	
PCB-88	(2.88)		PCB-108/124	(1.89)	C	PCB-144	(1.68)		PCB-163/138/129	4.88	J B C
PCB-91	(2.59)		PCB-107	(1.71)		PCB-147/149	[3.84]	J B EMPC C	PCB-160	(1.35)	
PCB-84	(3.18)		PCB-123	(1.95)		PCB-134	(2.01)		PCB-158	(1.25)	
PCB-89	(2.62)		PCB-106	(1.78)		PCB-143	(1.74)		PCB-128/166	(1.7)	C
PCB-121	(1.75)		PCB-118	4.5	J B	PCB-139/140	(1.57)	C	PCB-159	(1.3)	
PCB-92	(2.77)		PCB-122	(2.37)		PCB-131	(1.85)		PCB-162	(1.51)	
PCB-113/90/101	4.41	J B C	PCB-114	(1.99)		PCB-142	(1.88)		PCB-167	(1.53)	
PCB-83	(3.39)		PCB-105	[1.27]	J B EMPC	PCB-132	(1.75)		PCB-156/157	(2.28)	C
PCB-99	(1.86)		PCB-127	(1.87)		PCB-133	(1.65)		PCB-169	(1.97)	
PCB-112	(1.7)		PCB-126	(1.5)							
			Conc.	17					**Conc.**	4.88	
			EMPC	18.3					**EMPC**	13.7	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.42)		PCB-174	(2.96)		PCB-202	(1.83)		PCB-208	(6.29)	
PCB-179	(1.34)		PCB-177	(3.1)		PCB-201	(2.07)		PCB-207	(6.44)	
PCB-184	(1.46)		PCB-181	(2.88)		PCB-204	(1.78)		PCB-206	(15.3)	
PCB-176	(1.56)		PCB-171/173	(3.35)	C	PCB-197	(1.95)				
PCB-186	(1.28)		PCB-172	(3.27)		PCB-200	(1.91)		**Conc.**	0	
PCB-178	(2.05)		PCB-192	(2.24)		PCB-198/199	(2.35)	C	**EMPC**	0	
PCB-175	(3.22)		PCB-180/193	3.44	J C	PCB-196	(2.69)				
PCB-187	(2.63)		PCB-191	(2.57)		PCB-203	(2.16)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.7)		PCB-170	(3.78)		PCB-195	(4.61)		PCB-209	(4.6)	
PCB-183	(2.84)		PCB-190	(2.74)		PCB-194	(4.42)				
PCB-185	(3.51)		PCB-189	(2.46)		PCB-205	(3.88)				
			Conc.	3.44		**Conc.**	0				
			EMPC	3.44		**EMPC**	0				

Sample ID: Method Blank B3246_16671

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Sample ID:	MB1_16671_PCB_TLX	Date Extracted:	08-May-2019
Date Collected:	n/a	pH	n/a	QC Batch No.:	16671	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	3.53			ES PCB-1	65
PCB-81 344'5-TeCB	ND	3.43			ES PCB-3	72
PCB-105 233'44'-PeCB	EMPC		1.51	J	ES PCB-4	83.2
PCB-114 2344'5-PeCB	ND	1.46			ES PCB-15	83.7
PCB-118 23'44'5-PeCB	2.41			J	ES PCB-19	87
PCB-123 23'44'5'-PeCB	ND	1.54			ES PCB-37	80
PCB-126 33'44'5-PeCB	ND	1.52			ES PCB-54	83.6
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	1.62		C	ES PCB-77	79.2
PCB-167 23'44'55'-HxCB	ND	1.05			ES PCB-81	78.5
PCB-169 33'44'55'-HxCB	ND	1.43			ES PCB-104	93.5
PCB-189 233'44'55'-HpCB	ND	2.06			ES PCB-105	97.6
					ES PCB-114	98.1
TEQs (WHO 2005 M/H)					ES PCB-118	97.2
					ES PCB-123	98.1
ND = 0	0.0000724		0.000118		ES PCB-126	102
ND = 0.5 x DL	0.0985		0.0985		ES PCB-153	95.9
ND = DL	0.197		0.197		ES PCB-155	93.9
					ES PCB-156/157	112
Totals					ES PCB-167	107
Mono-CB	ND	2.7			ES PCB-169	125
Di-CB			13.3		ES PCB-170	88.9
Tri-CB	ND	5.73			ES PCB-180	85.5
Tetra-CB	ND	3.21			ES PCB-188	98.7
Penta-CB	2.41		12.4		ES PCB-189	93.7
Hexa-CB	6.53		8.53		ES PCB-202	101
Hepta-CB	ND	1.86			ES PCB-205	108
Octa-CB	ND	1.94			ES PCB-206	117
Nona-CB	ND	7.89			ES PCB-208	99
Deca-CB	ND	3.91			ES PCB-209	129
					CS PCB-28	86.7
Total PCB (Mono-Deca)	8.94		34.2		CS PCB-111	98.1
					CS PCB-178	101

Checkcode: 781-051-SZS/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:11 Analyst: MS

Sample ID: Method Blank B3246_16671

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B3246	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Sample ID:	MB1_16671_PCB_TLX	Date Extracted:	08-May-2019
Date Collected:	n/a	pH	n/a	QC Batch No.:	16671	Date Analyzed:	20-May-2019
		Units	pg/L	Checkcode:	781-051-SZS/C	Time Analyzed:	18:01:14

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(2.67)		PCB-19	(6.43)		PCB-54	(2.62)		PCB-72	(2.96)	
PCB-2	(2.54)		PCB-30/18	(4.59)	C	PCB-50/53	(3.4)	C	PCB-68	(3.19)	
PCB-3	(2.73)		PCB-17	(6.7)		PCB-45	(4.1)		PCB-57	(3.16)	
			PCB-27	(4.8)		PCB-51	(3.36)		PCB-58	(2.83)	
Conc.	0		PCB-24	(4.65)		PCB-46	(4.3)		PCB-67	(2.88)	
EMPC	0		PCB-16	(6.94)		PCB-52	(3.06)		PCB-63	(3.45)	
			PCB-32	(4.34)		PCB-73	(2.61)		PCB-61/70/74/76	(3.05)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.21)		PCB-43	(3.31)		PCB-66	(2.95)	
PCB-4	(2.14)		PCB-23	(5.25)		PCB-69/49	(3.02)	C	PCB-55	(2.9)	
PCB-10	(1.58)		PCB-26/29	(5.15)	C	PCB-48	(3.6)		PCB-56	(3.05)	
PCB-9	(1.66)		PCB-25	(4.42)		PCB-44/47/65	(3.12)	C	PCB-60	(3.65)	
PCB-7	(1.85)		PCB-31	(4.55)		PCB-59/62/75	(2.7)	C	PCB-80	(3.02)	
PCB-6	(1.58)		PCB-28/20	(4.91)	C	PCB-42	(3.94)		PCB-79	(2.81)	
PCB-5	(1.9)		PCB-21/33	(5.04)	C	PCB-41	(4.46)		PCB-78	(3.22)	
PCB-8	(1.55)		PCB-22	(4.55)		PCB-71/40	(3.2)	C	PCB-81	(3.43)	
PCB-14	(1.86)		PCB-36	(4.46)		PCB-64	(2.68)		PCB-77	(3.53)	
PCB-11	[13.3]	EMPC	PCB-39	(4.93)							
PCB-13/12	(1.84)	C	PCB-38	(4.89)							
PCB-15	(1.72)		PCB-35	(5.09)							
			PCB-37	(5.03)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	13.3		**EMPC**	0					**EMPC**	0	

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Tel: +1 910 794-1613
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Totals	**Conc.**	**EMPC**
Mono-Tri	0	13.3
Tetra-Hexa	8.94	20.9
Hepta-Deca	0	0
Mono-Deca	8.94	34.2

Sample ID: Method Blank B3246_16671

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.48)		PCB-109/119/86/97/125/87	(1.7)	C	PCB-155	(1.14)		PCB-165	(1.3)	
PCB-96	(1.49)		PCB-117	(1.64)		PCB-152	(1.07)		PCB-146	(1.31)	
PCB-103	(1.98)		PCB-116/85	(1.74)	C	PCB-150	(1.21)		PCB-161	(1.1)	
PCB-94	(2.42)		PCB-110	[2.65]	J EMPC	PCB-136	(1.28)		PCB-153/168	3.28	J C
PCB-95	[2.52]	J EMPC	PCB-115	(1.44)		PCB-145	(1.13)		PCB-141	(1.6)	
PCB-100/93	(2.15)	C	PCB-82	(2.14)		PCB-148	(1.54)		PCB-130	(1.88)	
PCB-102	(1.6)		PCB-111	(1.53)		PCB-151/135	(1.54)	C	PCB-137	(1.74)	
PCB-98	(2.16)		PCB-120	(1.24)		PCB-154	(1.46)		PCB-164	(1.07)	
PCB-88	(2.28)		PCB-108/124	(1.49)	C	PCB-144	(1.56)		PCB-163/138/129	3.25	J C
PCB-91	(2.04)		PCB-107	(1.35)		PCB-147/149	[2]	J EMPC C	PCB-160	(1.26)	
PCB-84	(2.51)		PCB-123	(1.54)		PCB-134	(1.87)		PCB-158	(1.16)	
PCB-89	(2.06)		PCB-106	(1.4)		PCB-143	(1.61)		PCB-128/166	(1.17)	C
PCB-121	(1.38)		PCB-118	2.41	J	PCB-139/140	(1.46)	C	PCB-159	(0.893)	
PCB-92	(2.19)		PCB-122	(1.74)		PCB-131	(1.72)		PCB-162	(1.04)	
PCB-113/90/101	[3.31]	J EMPC C	PCB-114	(1.46)		PCB-142	(1.75)		PCB-167	(1.05)	
PCB-83	(2.67)		PCB-105	[1.51]	J EMPC	PCB-132	(1.63)		PCB-156/157	(1.62)	C
PCB-99	(1.47)		PCB-127	(1.46)		PCB-133	(1.53)		PCB-169	(1.43)	
PCB-112	(1.34)		PCB-126	(1.52)							
			Conc.	2.41					**Conc.**	6.53	
			EMPC	12.4					**EMPC**	8.53	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.14)		PCB-174	(1.93)		PCB-202	(1.13)		PCB-208	(4.59)	
PCB-179	(1.08)		PCB-177	(2.02)		PCB-201	(1.28)		PCB-207	(4.7)	
PCB-184	(1.17)		PCB-181	(1.88)		PCB-204	(1.1)		PCB-206	(11.2)	
PCB-176	(1.25)		PCB-171/173	(2.19)	C	PCB-197	(1.2)				
PCB-186	(1.03)		PCB-172	(2.14)		PCB-200	(1.18)		**Conc.**	0	
PCB-178	(1.64)		PCB-192	(1.46)		PCB-198/199	(1.45)	C	**EMPC**	0	
PCB-175	(2.1)		PCB-180/193	(1.78)	C	PCB-196	(1.66)				
PCB-187	(1.72)		PCB-191	(1.68)		PCB-203	(1.33)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.76)		PCB-170	(2.73)		PCB-195	(3.27)		PCB-209	(3.91)	
PCB-183	(1.85)		PCB-190	(1.98)		PCB-194	(3.14)				
PCB-185	(2.29)		PCB-189	(2.06)		PCB-205	(2.75)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_08292018_04Jan2019
Instrument ID: MM4 GC Column ID:
VER Data Filename: 190520S09 Analysis Date: 20-MAY-2019 17:03:47
Lab ID: OPR1_16671_PCB

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)	OK
PCB-1 2-MoCB	50	108	60 - 135	Y
PCB-3 4-MoCB	50	108	60 - 135	Y
PCB-4 22'-DiCB	50	110	60 - 135	Y
PCB-15 44'-DiCB	50	102	60 - 135	Y
PCB-19 22'6-TrCB	50	106	60 - 135	Y
PCB-37 344'-TrCB	50	102	60 - 135	Y
PCB-54 22'66'-TeCB	50	104	60 - 135	Y
PCB-77 33'44'-TeCB	50	100	60 - 135	Y
PCB-81 344'5-TeCB	50	90.6	60 - 135	Y
PCB-104 22'466'-PeCB	50	93.7	60 - 135	Y
PCB-105 233'44'-PeCB	50	99.3	60 - 135	Y
PCB-114 2344'5-PeCB	50	96.5	60 - 135	Y
PCB-118 23'44'5-PeCB	50	96.6	60 - 135	Y
PCB-123 23'44'5'-PeCB	50	93.3	60 - 135	Y
PCB-126 33'44'5-PeCB	50	116	60 - 135	Y
PCB-155 22'44'66'-HxCB	50	88.7	60 - 135	Y
PCB-156/157 ...-HxCB	100	97.2	60 - 135	Y
PCB-167 23'44'55'-HxCB	50	99.6	60 - 135	Y
PCB-169 33'44'55'-HxCB	50	109	60 - 135	Y
PCB-188 22'34'566'-HpCB	50	99.6	60 - 135	Y
PCB-189 233'44'55'-HpCB	50	98.2	60 - 135	Y
PCB-202 22'33'55'66'-OcCB	50	95	60 - 135	Y
PCB-205 233'44'55'6-OcCB	50	102	60 - 135	Y
PCB-206 22'33'44'55'6-NoCB	50	108	60 - 135	Y
PCB-208 22'33'455'66'-NoCB	50	99.2	60 - 135	Y
PCB-209 DeCB	50	89	60 - 135	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668C.

Processed: 21 May 2019 09:11 Analyst: MS

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM4_PCB_08292018_04Jan2019		
Instrument ID:	MM4	GC Column ID:	
VER Data Filename:	190520S09	Analysis Date:	20-MAY-2019 17:03:47
Lab ID:	OPR1_16671_PCB		

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	65.4	15	-	145	Y
ES PCB-3	100	68.6	15	-	145	Y
ES PCB-4	100	79.5	15	-	145	Y
ES PCB-15	100	75.4	15	-	145	Y
ES PCB-19	100	79.7	15	-	145	Y
ES PCB-37	100	73.8	15	-	145	Y
ES PCB-54	100	72.1	15	-	145	Y
ES PCB-77	100	73.3	40	-	145	Y
ES PCB-81	100	71.3	40	-	145	Y
ES PCB-104	100	91.9	40	-	145	Y
ES PCB-105	100	96.2	40	-	145	Y
ES PCB-114	100	93.4	40	-	145	Y
ES PCB-118	100	92.4	40	-	145	Y
ES PCB-123	100	94.1	40	-	145	Y
ES PCB-126	100	95.2	40	-	145	Y
ES PCB-153	100	98	40	-	145	Y
ES PCB-155	100	94.7	40	-	145	Y
ES PCB-156/157	200	111	40	-	145	Y
ES PCB-167	100	103	40	-	145	Y
ES PCB-169	100	120	40	-	145	Y
ES PCB-170	100	89.9	40	-	145	Y
ES PCB-180	100	82.5	40	-	145	Y
ES PCB-188	100	94.3	40	-	145	Y
ES PCB-189	100	94.9	40	-	145	Y
ES PCB-202	100	101	40	-	145	Y
ES PCB-205	100	106	40	-	145	Y
ES PCB-206	100	120	40	-	145	Y
ES PCB-208	100	99.7	40	-	145	Y
ES PCB-209	100	132	40	-	145	Y
CLEANUP STANDARDS						
CS PCB-28	100	80	15	-	145	Y
CS PCB-111	100	88.7	40	-	145	Y
CS PCB-178	100	94.6	40	-	145	Y

Processed: 21 May 2019 09:11 Analyst: MS

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*30-Apr-19 at 11:48*
AP Project name:	*B3246*
Requested TAT:	*21 days*
Projected due date:	*21-May-19*
Matrix:	*Aqueous*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Nord Door*
Project PO#:	*108.00228.00059*
QAAP/Contract #:	*n/a*
Requested Analysis:	*Method 1668C*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
GP-801-GW	B3246_001	Water	2	1-Liter Amber	26-Apr-19	09:00	0.9	1	7869 4161 1768
GP-802-GW	B3246_002**	Water	2	1-Liter Amber	26-Apr-19	16:35	0.9	1	7869 4161 1768

Preservation Type: **Sample Seals:** No

Notes/Comments:

*Possible follow-up D/F analysis. **Sample 002 id on COC does not match id on sample, logged according sample label.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens *Logged in by: Ashley Owens* *QC'ed by:* AK 30 Apr 19

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

SGS

CHAIN OF CUSTODY

B3246

PROJECT INFO
PROJECT: Nord Door
P.O. #: 1066.00228.00059
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard TAT
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

PRESERVATIVE

SEND DOCUMENTATION / RESULTS TO
COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd, ste 440
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO ☒ (CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

ANALYSIS & METHOD

	SAMPLE ID / DESCRIPTION	**DATE**	**TIME**	**QTY**	**MATRIX**	PCB	Dioxin / Furan									**MS MSD**	**MS/ DUP**	**REMARKS**
001	GP-801-GW	4/29/19	0900	2	water	X												Possible followup Dioxin/Furan analysis
002	GP-801-GW *	4/26/19	1635	2	water	X												" " " " "
	*sample label reads																	
	GP-802-GW																	
	ak 4/30/19																	

COLLECTED/RELINQUISHED BY (1): Steve	**DATE:** 4/29/19	**TIME:** 1400	**RECEIVED BY:**
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY (3):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: Ashley Owens DATE: 4/30/19 TIME: 11:48
COOLER SEAL: ☒ INTACT ☐ BROKEN ~~☒ ABSENT~~ ak 4/30/19
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: FedEx TEMP: °C 0.9°
TRACKING #: 7869 4161 1768

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'Xx' denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

SGS CERTIFICATIONS

Alaska	17-012
Arkansas	18-042-0
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.1)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA031
Maine	2018018
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1535636
Mississippi	Reciprocity
Montana	0106
New Hampshire	208318 & 208518
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Vermont	VT-87634
Virginia	10101
Washington	C913
West Virginia	293

Rev. 06-Mar-2019

Sample ID: GP-MW-11-SS

Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	12.13 g	Lab Sample ID	B3245_16666_DF_001	Date Extracted:	07-May-2019
Date Collected:	25-Apr-2019	% Solid:	74.2 %	QC Batch No:	16666	Date Analyzed:	13-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	17:46:56

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	EMPC		0.33	J	ES 2378-TCDD	82.9	
12378-PeCDD	ND	0.211			ES 12378-PeCDD	67	
123478-HxCDD	EMPC		0.978	J	ES 123478-HxCDD	82.7	
123678-HxCDD	EMPC		5.49		ES 123678-HxCDD	85.8	
123789-HxCDD	EMPC		1.52	J	ES 123789-HxCDD	78.6	
1234678-HpCDD	149				ES 1234678-HpCDD	63.7	
OCDD	1,570				ES OCDD	43.1	
2378-TCDF	ND	0.246			ES 2378-TCDF	78.8	
12378-PeCDF	0.482			J	ES 12378-PeCDF	74	
23478-PeCDF	0.908			J	ES 23478-PeCDF	75	
123478-HxCDF	3.74				ES 123478-HxCDF	77.1	
123678-HxCDF	1.67			J	ES 123678-HxCDF	81.6	
234678-HxCDF	1.66			J	ES 234678-HxCDF	82.5	
123789-HxCDF	ND	0.271			ES 123789-HxCDF	68.5	
1234678-HpCDF	16.6				ES 1234678-HpCDF	81.6	
1234789-HpCDF	EMPC		0.684	J	ES 1234789-HpCDF	61	
OCDF	EMPC		11.8		ES OCDF	41.9	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	85.3	
Total TCDD	0.59		1.19		CS 12347-PeCDD	82.1	
Total PeCDD	1.85		1.85		CS 12346-PeCDF	84.8	
Total HxCDD	16.5		25.2		CS 123469-HxCDF	97.4	
Total HpCDD	264		264		CS 1234689-HpCDF	83.9	
Total TCDF	1.83		3.06				
Total PeCDF	16.4		16.6				
Total HxCDF	46.6		47.8				
Total HpCDF	43.6		45.1				
Total PCDD/Fs	**1,960**		**1,980**				
WHO-2005 TEQs							
TEQ: ND=0	3.12		4.26				
TEQ: ND=DL/2	3.25	0.388	4.39				
TEQ: ND=DL	3.38	0.776	4.52				

5500 Business Drive
Wilmington, NC 28405, USA
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Tel: +1 910 794-1613; Toll-Free 866 846-8290

Sample ID: GP-MW-12-SS Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	14.69 g	Lab Sample ID	B3245_16666_DF_002	Date Extracted:	07-May-2019
Date Collected:	25-Apr-2019	% Solid:	89.3 %	QC Batch No:	16666	Date Analyzed:	13-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	18:34:57

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.154			ES 2378-TCDD	80.3	
12378-PeCDD	ND	0.17			ES 12378-PeCDD	76.1	
123478-HxCDD	ND	0.0924			ES 123478-HxCDD	78.2	
123678-HxCDD	EMPC		0.36	J	ES 123678-HxCDD	79.4	
123789-HxCDD	0.307			J	ES 123789-HxCDD	78	
1234678-HpCDD	5.61				ES 1234678-HpCDD	63.1	
OCDD	40.5				ES OCDD	43.1	
2378-TCDF	EMPC		0.25	J	ES 2378-TCDF	85.6	
12378-PeCDF	ND	0.165			ES 12378-PeCDF	78.1	
23478-PeCDF	ND	0.154			ES 23478-PeCDF	80.2	
123478-HxCDF	ND	0.0684			ES 123478-HxCDF	77	
123678-HxCDF	ND	0.0693			ES 123678-HxCDF	78.4	
234678-HxCDF	ND	0.0699			ES 234678-HxCDF	78.2	
123789-HxCDF	ND	0.0947			ES 123789-HxCDF	72.3	
1234678-HpCDF	EMPC		0.788	J	ES 1234678-HpCDF	68.7	
1234789-HpCDF	ND	0.158			ES 1234789-HpCDF	62.3	
OCDF	2.33			J	ES OCDF	45.3	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	96.4	
Total TCDD	1.18		1.55		CS 12347-PeCDD	95.7	
Total PeCDD	ND		1.08		CS 12346-PeCDF	93.4	
Total HxCDD	1.86		3.33		CS 123469-HxCDF	100	
Total HpCDD	20		20		CS 1234689-HpCDF	84.1	
Total TCDF	0.172		0.884				
Total PeCDF	ND		1.04				
Total HxCDF	1.72		1.72				
Total HpCDF	ND		2.33				
Total PCDD/Fs	**67.8**		**74.8**				
WHO-2005 TEQs							
TEQ: ND=0	0.0996		0.168				
TEQ: ND=DL/2	0.308	0.223	0.377				
TEQ: ND=DL	0.516	0.447	0.585				

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Report Created: 17-May-2019 13:31 Analyst: FS

Sample ID: GP-MW-12-SS-18-19 Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	9.35 g	Lab Sample ID	B3245_16666_DF_003	Date Extracted:	07-May-2019
Date Collected:	25-Apr-2019	% Solid:	61.6 %	QC Batch No:	16666	Date Analyzed:	13-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	19:24:32

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	EMPC		0.596		ES 2378-TCDD	77.6	
12378-PeCDD	1.41			J	ES 12378-PeCDD	69.5	
123478-HxCDD	EMPC		1.72	J	ES 123478-HxCDD	74	
123678-HxCDD	EMPC		3.95		ES 123678-HxCDD	77.8	
123789-HxCDD	EMPC		1.96	J	ES 123789-HxCDD	78.3	
1234678-HpCDD	31.4				ES 1234678-HpCDD	62.9	
OCDD	111				ES OCDD	40.2	
2378-TCDF	1.78				ES 2378-TCDF	80.1	
12378-PeCDF	1.11			J	ES 12378-PeCDF	75.6	
23478-PeCDF	1.49			J	ES 23478-PeCDF	76	
123478-HxCDF	EMPC		1.17	J	ES 123478-HxCDF	78.4	
123678-HxCDF	EMPC		0.85	J	ES 123678-HxCDF	77.9	
234678-HxCDF	0.993			J	ES 234678-HxCDF	79	
123789-HxCDF	ND	0.196			ES 123789-HxCDF	69.7	
1234678-HpCDF	4.87				ES 1234678-HpCDF	66.7	
1234789-HpCDF	EMPC		0.292	J	ES 1234789-HpCDF	63.7	
OCDF	2.15			J	ES OCDF	43	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	86.7	
Total TCDD	45.2		53		CS 12347-PeCDD	84.2	
Total PeCDD	50.6		51.5		CS 12346-PeCDF	88	
Total HxCDD	49.6		63.6		CS 123469-HxCDF	95.4	
Total HpCDD	63.9		63.9		CS 1234689-HpCDF	76.2	
Total TCDF	36.7		39.1				
Total PeCDF	20.1		20.9				
Total HxCDF	3.98		10.6				
Total HpCDF	7.58		7.87				
Total PCDD/Fs	**391**		**424**				
WHO-2005 TEQs							
TEQ: ND=0	2.56		4.12				
TEQ: ND=DL/2	2.57	0.233	4.13				
TEQ: ND=DL	2.58	0.465	4.14				

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Sample ID: GP-MW-13-SS Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	13.81 g	Lab Sample ID	B3245_16666_DF_004	Date Extracted:	07-May-2019
Date Collected:	25-Apr-2019	% Solid:	84.6 %	QC Batch No:	16666	Date Analyzed:	13-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	20:21:49

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.0744			ES 2378-TCDD	81.4	
12378-PeCDD	ND	0.239			ES 12378-PeCDD	73.7	
123478-HxCDD	ND	0.136			ES 123478-HxCDD	79.3	
123678-HxCDD	EMPC		0.424	J	ES 123678-HxCDD	82.8	
123789-HxCDD	EMPC		0.198	J	ES 123789-HxCDD	83.5	
1234678-HpCDD	5.56				ES 1234678-HpCDD	66.6	
OCDD	55.6				ES OCDD	44.4	
2378-TCDF	0.246			J	ES 2378-TCDF	85.1	
12378-PeCDF	ND	0.0967			ES 12378-PeCDF	81.7	
23478-PeCDF	ND	0.1			ES 23478-PeCDF	78.5	
123478-HxCDF	ND	0.102			ES 123478-HxCDF	80	
123678-HxCDF	ND	0.098			ES 123678-HxCDF	83	
234678-HxCDF	ND	0.0985			ES 234678-HxCDF	83.7	
123789-HxCDF	ND	0.121			ES 123789-HxCDF	76	
1234678-HpCDF	EMPC		1.43	J	ES 1234678-HpCDF	73.3	
1234789-HpCDF	ND	0.183			ES 1234789-HpCDF	66.4	
OCDF	3.66				ES OCDF	48.6	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	96.1	
Total TCDD	0.727		1.94		CS 12347-PeCDD	98.1	
Total PeCDD	ND		0.632		CS 12346-PeCDF	103	
Total HxCDD	1.3		3.96		CS 123469-HxCDF	111	
Total HpCDD	16		16		CS 1234689-HpCDF	92.6	
Total TCDF	0.487		1.26				
Total PeCDF	ND		0.415				
Total HxCDF	1.91		1.91				
Total HpCDF	3.57		5				
Total PCDD/Fs	**83.2**		**90.4**				
WHO-2005 TEQs							
TEQ: ND=0	0.098		0.174				
TEQ: ND=DL/2	0.3	0.221	0.376				
TEQ: ND=DL	0.501	0.443	0.578				

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Sample ID: GP-MW-14-SS Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	14.69 g	Lab Sample ID	B3245_16666_DF_005	Date Extracted:	07-May-2019
Date Collected:	25-Apr-2019	% Solid:	89.3 %	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	1:31:37

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.0999			ES 2378-TCDD	93.5	
12378-PeCDD	ND	0.139			ES 12378-PeCDD	75.7	
123478-HxCDD	ND	0.138			ES 123478-HxCDD	81.5	
123678-HxCDD	EMPC		0.352	J	ES 123678-HxCDD	83.1	
123789-HxCDD	ND	0.142			ES 123789-HxCDD	80.5	
1234678-HpCDD	5.42				ES 1234678-HpCDD	83.7	
OCDD	41.9				ES OCDD	46.9	
2378-TCDF	0.164			J	ES 2378-TCDF	93.1	
12378-PeCDF	ND	0.102			ES 12378-PeCDF	85.7	
23478-PeCDF	ND	0.108			ES 23478-PeCDF	86.8	
123478-HxCDF	ND	0.103			ES 123478-HxCDF	81.4	
123678-HxCDF	ND	0.0928			ES 123678-HxCDF	83.3	
234678-HxCDF	ND	0.0926			ES 234678-HxCDF	82.3	
123789-HxCDF	ND	0.115			ES 123789-HxCDF	79.2	
1234678-HpCDF	EMPC		0.983	J	ES 1234678-HpCDF	78.7	
1234789-HpCDF	ND	0.0641			ES 1234789-HpCDF	73.7	
OCDF	3.18			J	ES OCDF	54	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	101	
Total TCDD	1		1.41		CS 12347-PeCDD	93.1	
Total PeCDD	0.659		0.849		CS 12346-PeCDF	104	
Total HxCDD	1.96		3.1		CS 123469-HxCDF	106	
Total HpCDD	12.7		12.7		CS 1234689-HpCDF	94.2	
Total TCDF	0.164		0.327				
Total PeCDF	ND		0.297				
Total HxCDF	1.44		1.44				
Total HpCDF	2.73		3.71				
Total PCDD/Fs	**65.7**		**68.9**				
WHO-2005 TEQs							
TEQ: ND=0	0.0841		0.129				
TEQ: ND=DL/2	0.256	0.185	0.301				
TEQ: ND=DL	0.427	0.369	0.472				

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Sample ID: GP-MW-16-SS

Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	14.20 g	Lab Sample ID	B3245_16666_DF_007	Date Extracted:	07-May-2019
Date Collected:	26-Apr-2019	% Solid:	86.8 %	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	2:19:34

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	EMPC		0.27	J	ES 2378-TCDD	87.2	
12378-PeCDD	1.06			J	ES 12378-PeCDD	76.3	
123478-HxCDD	EMPC		1.43	J	ES 123478-HxCDD	84.1	
123678-HxCDD	10.6				ES 123678-HxCDD	81.4	
123789-HxCDD	3.96				ES 123789-HxCDD	82.3	
1234678-HpCDD	250				ES 1234678-HpCDD	73.9	
OCDD	1,680				ES OCDD	51.4	
2378-TCDF	1.15				ES 2378-TCDF	81.3	
12378-PeCDF	0.877			J	ES 12378-PeCDF	76.4	
23478-PeCDF	1.11			J	ES 23478-PeCDF	81	
123478-HxCDF	3.18				ES 123478-HxCDF	85.2	
123678-HxCDF	3.57				ES 123678-HxCDF	87.9	
234678-HxCDF	5.59				ES 234678-HxCDF	88.4	
123789-HxCDF	ND	0.182			ES 123789-HxCDF	82.9	
1234678-HpCDF	60.6				ES 1234678-HpCDF	81	
1234789-HpCDF	3.1				ES 1234789-HpCDF	70.8	
OCDF	115				ES OCDF	53.2	

Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	97.5	
Total TCDD	13.2		14.5		CS 12347-PeCDD	96.3	
Total PeCDD	18.1		19.5		CS 12346-PeCDF	107	
Total HxCDD	119		121		CS 123469-HxCDF	110	
Total HpCDD	680		680		CS 1234689-HpCDF	93.9	
Total TCDF	43.3		45.6				
Total PeCDF	81.9		82.2				
Total HxCDF	112		113				
Total HpCDF	167		169				
Total PCDD/Fs	**3,030**		**3,040**				
WHO-2005 TEQs							
TEQ: ND=0	7.89		8.31				
TEQ: ND=DL/2	7.9	0.186	8.32				
TEQ: ND=DL	7.91	0.371	8.33				

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Report Created: 17-May-2019 13:31 Analyst: FS

Sample ID: GP-MW-17-SS Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	13.52 g	Lab Sample ID	B3245_16666_DF_008	Date Extracted:	07-May-2019
Date Collected:	26-Apr-2019	% Solid:	83.5 %	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	3:09:12

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.144			ES 2378-TCDD	89.1	
12378-PeCDD	ND	0.217			ES 12378-PeCDD	78.8	
123478-HxCDD	ND	0.198			ES 123478-HxCDD	83.3	
123678-HxCDD	EMPC		0.644	J	ES 123678-HxCDD	86.3	
123789-HxCDD	EMPC		0.294	J	ES 123789-HxCDD	85.6	
1234678-HpCDD	17.2				ES 1234678-HpCDD	71.1	
OCDD	233				ES OCDD	41.4	
2378-TCDF	ND	0.183			ES 2378-TCDF	90.2	
12378-PeCDF	ND	0.109			ES 12378-PeCDF	83.9	
23478-PeCDF	ND	0.113			ES 23478-PeCDF	86.2	
123478-HxCDF	0.361			J	ES 123478-HxCDF	88.1	
123678-HxCDF	EMPC		0.268	J	ES 123678-HxCDF	89	
234678-HxCDF	EMPC		0.414	J	ES 234678-HxCDF	88.1	
123789-HxCDF	ND	0.233			ES 123789-HxCDF	79.5	
1234678-HpCDF	6.01				ES 1234678-HpCDF	81.8	
1234789-HpCDF	0.321			J	ES 1234789-HpCDF	70.6	
OCDF	19.4				ES OCDF	50.8	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	95.3	
Total TCDD	2.08		2.21		CS 12347-PeCDD	93.1	
Total PeCDD	1.17		1.52		CS 12346-PeCDF	98.1	
Total HxCDD	6.29		7.69		CS 123469-HxCDF	109	
Total HpCDD	39.5		39.5		CS 1234689-HpCDF	90.8	
Total TCDF	0.363		0.743				
Total PeCDF	2.28		2.42				
Total HxCDF	8.14		8.82				
Total HpCDF	20.4		20.4				
Total PCDD/Fs	**332**		**335**				
WHO-2005 TEQs							
TEQ: ND=0	0.347		0.509				
TEQ: ND=DL/2	0.577	0.278	0.739				
TEQ: ND=DL	0.806	0.556	0.968				

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Sample ID: GP-801-SS

Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	13.90 g	Lab Sample ID	B3245_16666_DF_009	Date Extracted:	07-May-2019
Date Collected:	26-Apr-2019	% Solid:	83.3 %	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	3:58:50

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.0799			ES 2378-TCDD	90.7	
12378-PeCDD	EMPC		0.194	J	ES 12378-PeCDD	81.8	
123478-HxCDD	0.299			J	ES 123478-HxCDD	84.7	
123678-HxCDD	2				ES 123678-HxCDD	86.9	
123789-HxCDD	0.571			J	ES 123789-HxCDD	83.3	
1234678-HpCDD	63.5				ES 1234678-HpCDD	73	
OCDD	1,380				ES OCDD	45.2	
2378-TCDF	EMPC		0.223	J	ES 2378-TCDF	91.8	
12378-PeCDF	0.258			J	ES 12378-PeCDF	84.9	
23478-PeCDF	EMPC		0.276	J	ES 23478-PeCDF	87.8	
123478-HxCDF	0.579			J	ES 123478-HxCDF	84.9	
123678-HxCDF	0.807			J	ES 123678-HxCDF	85.8	
234678-HxCDF	1.07			J	ES 234678-HxCDF	86.9	
123789-HxCDF	ND	0.11			ES 123789-HxCDF	80.2	
1234678-HpCDF	7.32				ES 1234678-HpCDF	77.7	
1234789-HpCDF	0.62			J	ES 1234789-HpCDF	69.7	
OCDF	12				ES OCDF	52.1	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	91.9	
Total TCDD	1.65		3.5		CS 12347-PeCDD	93.1	
Total PeCDD	3.73		5.15		CS 12346-PeCDF	96.9	
Total HxCDD	23.8		23.9		CS 123469-HxCDF	103	
Total HpCDD	147		147		CS 1234689-HpCDF	85.4	
Total TCDF	4.22		4.73				
Total PeCDF	4.04		6.47				
Total HxCDF	17.5		17.5				
Total HpCDF	30.5		30.5				
Total PCDD/Fs	**1,620**		**1,630**				
WHO-2005 TEQs							
TEQ: ND=0	1.67		1.97				
TEQ: ND=DL/2	1.72	0.167	2.02				
TEQ: ND=DL	1.76	0.333	2.06				

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Sample ID: GP-802-SS Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	14.43 g	Lab Sample ID	B3245_16666_DF_010	Date Extracted:	07-May-2019
Date Collected:	26-Apr-2019	% Solid:	90.5 %	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	4:48:28

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.115			ES 2378-TCDD	82.2	
12378-PeCDD	0.903			J	ES 12378-PeCDD	74.7	
123478-HxCDD	1.24			J	ES 123478-HxCDD	85.2	
123678-HxCDD	7.66				ES 123678-HxCDD	85.3	
123789-HxCDD	3.21				ES 123789-HxCDD	71.2	
1234678-HpCDD	130				ES 1234678-HpCDD	67.7	
OCDD	1,300				ES OCDD	38	
2378-TCDF	0.58				ES 2378-TCDF	87.1	
12378-PeCDF	0.375			J	ES 12378-PeCDF	77.6	
23478-PeCDF	0.411			J	ES 23478-PeCDF	84.9	
123478-HxCDF	EMPC		0.464	J	ES 123478-HxCDF	82.5	
123678-HxCDF	0.738			J	ES 123678-HxCDF	82.6	
234678-HxCDF	1.09			J	ES 234678-HxCDF	80.3	
123789-HxCDF	ND	0.173			ES 123789-HxCDF	73.6	
1234678-HpCDF	17.7				ES 1234678-HpCDF	69.3	
1234789-HpCDF	0.907			J	ES 1234789-HpCDF	65.8	
OCDF	27.8				ES OCDF	43.1	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	87.7	
Total TCDD	5.04		6.25		CS 12347-PeCDD	90.5	
Total PeCDD	6.55		9.95		CS 12346-PeCDF	96.2	
Total HxCDD	50.7		51.4		CS 123469-HxCDF	107	
Total HpCDD	268		268		CS 1234689-HpCDF	82.6	
Total TCDF	3.63		8.37				
Total PeCDF	7.27		7.27				
Total HxCDF	23.7		24.2				
Total HpCDF	58.2		58.2				
Total PCDD/Fs	**1,760**		**1,770**				
WHO-2005 TEQs							
TEQ: ND=0	4.37		4.42				
TEQ: ND=DL/2	4.44	0.269	4.48				
TEQ: ND=DL	4.5	0.538	4.55				

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Checkcode: 137-283-NBS SGS North America - DF v0.7 Report Created: 17-May-2019 13:31 Analyst: FS

Sample ID: Method Blank B3245_16666 Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B3245	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	10.00 g	Lab Sample ID	MB1_16666_DF_SDS	Date Extracted:	07-May-2019
Date Collected:	n/a	% Solid:	n/a	QC Batch No:	16666	Date Analyzed:	14-May-2019
		Split:	-	Dilution:	-	Time Analyzed:	0:34:19

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.113			ES 2378-TCDD	84.9	
12378-PeCDD	ND	0.125			ES 12378-PeCDD	77.7	
123478-HxCDD	ND	0.084			ES 123478-HxCDD	83.9	
123678-HxCDD	ND	0.0777			ES 123678-HxCDD	88.1	
123789-HxCDD	ND	0.0844			ES 123789-HxCDD	83	
1234678-HpCDD	ND	0.0793			ES 1234678-HpCDD	72.3	
OCDD	ND	0.0892			ES OCDD	45.6	
2378-TCDF	ND	0.0788			ES 2378-TCDF	84.9	
12378-PeCDF	ND	0.0664			ES 12378-PeCDF	79.7	
23478-PeCDF	ND	0.0654			ES 23478-PeCDF	78.9	
123478-HxCDF	ND	0.053			ES 123478-HxCDF	79.2	
123678-HxCDF	ND	0.0572			ES 123678-HxCDF	80.5	
234678-HxCDF	ND	0.0547			ES 234678-HxCDF	78.7	
123789-HxCDF	ND	0.0686			ES 123789-HxCDF	75.7	
1234678-HpCDF	ND	0.0571			ES 1234678-HpCDF	79	
1234789-HpCDF	ND	0.0734			ES 1234789-HpCDF	70.4	
OCDF	ND	0.123			ES OCDF	49.4	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	93.9	
Total TCDD	ND	0.113	ND		CS 12347-PeCDD	89.9	
Total PeCDD	ND	0.125	ND		CS 12346-PeCDF	93.1	
Total HxCDD	ND	0.0818	ND		CS 123469-HxCDF	93.6	
Total HpCDD	ND	0.0793	ND		CS 1234689-HpCDF	84.9	
Total TCDF	ND	0.0788	ND				
Total PeCDF	ND	0.0659	ND				
Total HxCDF	ND	0.058	ND				
Total HpCDF	ND	0.0645	ND				
Total PCDD/Fs	**ND**		**ND**				
WHO-2005 TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	0.159	0.159	0.159				
TEQ: ND=DL	0.318	0.318	0.318				

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METHOD 1613B **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_10122018_26NOV2018		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	190513B14	Analysis Date:	13-MAY-2019 22:55:08
Lab ID:	OPR1_16666_DF		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	10.2	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	50.3	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	55.3	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	54.5	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	52.6	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	53.1	35	-	70	Y
OCDD	100	113	78	-	144	Y
2,3,7,8-TCDF	10	11.6	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	51	40	-	67	Y
2,3,4,7,8-PeCDF	50	56.6	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	53.8	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	55.2	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	54.8	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	50.1	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	53.1	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	50.7	39	-	69	Y
OCDF	100	106	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6, Method 1613. 10/94

Processed: 17 May 2019 13:31 Analyst: FS

METHOD 1613B PCDD/F ONGOING PRECISION AND RECOVERY (OPR) FORM 8B

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_10122018_26NOV2018		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	190513B14	Analysis Date:	13-MAY-2019 22:55:08
Lab ID:	OPR1_16666_DF		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	87.3	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	78.9	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	84.1	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	89.5	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	83.1	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	73.8	26	-	166	Y
13C-OCDD	200	91.5	26	-	397	Y
13C-2,3,7,8-TCDF	100	90.4	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	88.6	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	85.9	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	86.1	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	89.6	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	86.8	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	80.2	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	80.6	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	74.5	20	-	186	Y
13C-OCDF	200	103	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	39.2	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 17 May 2019 13:31 Analyst: FS

Sample ID: GP-MW-11-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.03 g	Sample ID:	B3245_16683_PCB_001-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	74.2 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.495			ES PCB-1	63
PCB-81 344'5-TeCB	ND	0.48			ES PCB-3	71.9
PCB-105 233'44'-PeCB	1.5				ES PCB-4	78.3
PCB-114 2344'5-PeCB	ND	0.275			ES PCB-15	84.4
PCB-118 23'44'5-PeCB	4.25				ES PCB-19	85.4
PCB-123 23'44'5'-PeCB	ND	0.277			ES PCB-37	82.5
PCB-126 33'44'5-PeCB	ND	0.243			ES PCB-54	76.1
PCB-156/157 233'44'5/233'44'5'-HxCB	EMPC		0.729	J C	ES PCB-77	84
PCB-167 23'44'55'-HxCB	EMPC		0.354	J	ES PCB-81	83.6
PCB-169 33'44'55'-HxCB	ND	0.326			ES PCB-104	96
PCB-189 233'44'55'-HpCB	ND	0.259			ES PCB-105	102
					ES PCB-114	100
TEQs (WHO 2005 M/H)					ES PCB-118	100
					ES PCB-123	103
ND = 0	0.000173		0.000205		ES PCB-126	98.6
ND = 0.5 x DL	0.0174		0.0174		ES PCB-153	99.4
ND = DL	0.0345		0.0345		ES PCB-155	94.6
					ES PCB-156/157	114
Totals					ES PCB-167	106
Mono-CB	ND	0.554			ES PCB-169	106
Di-CB	3.77				ES PCB-170	93.8
Tri-CB	4.04				ES PCB-180	90.2
Tetra-CB	10.5		13.1		ES PCB-188	100
Penta-CB	37.1		39.4		ES PCB-189	102
Hexa-CB	33.9		42.5		ES PCB-202	102
Hepta-CB	16.4		20.7		ES PCB-205	111
Octa-CB	16		17.8		ES PCB-206	127
Nona-CB	25.7				ES PCB-208	103
Deca-CB	11.2				ES PCB-209	138
					CS PCB-28	92.3
Total PCB (Mono-Deca)	159		178		CS PCB-111	103
					CS PCB-178	107

Checkcode: 747-153-MYC/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: ah

Sample ID: GP-MW-11-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.03 g	Sample ID:	B3245_16683_PCB_001-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	74.2 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019
		Units	pg/g	Checkcode:	747-153-MYC/C	Time Analyzed:	17:24:32

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(0.557)		PCB-19	(0.742)		PCB-54	(0.367)		PCB-72	(0.431)	
PCB-2	(0.517)		PCB-30/18	0.918	J C	PCB-50/53	(0.452)	C	PCB-68	(0.458)	
PCB-3	(0.551)		PCB-17	(0.796)		PCB-45	(0.531)		PCB-57	(0.452)	
			PCB-27	(0.566)		PCB-51	(0.458)		PCB-58	(0.405)	
Conc.	0		PCB-24	(0.554)		PCB-46	(0.57)		PCB-67	(0.41)	
EMPC	0		PCB-16	(0.833)		PCB-52	2.14		PCB-63	(0.495)	
			PCB-32	(0.515)		PCB-73	(0.348)		PCB-61/70/74/76	3.29	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.589)		PCB-43	(0.452)		PCB-66	2.14	
PCB-4	(0.468)		PCB-23	(0.585)		PCB-69/49	1.22	J C	PCB-55	(0.419)	
PCB-10	(0.347)		PCB-26/29	(0.575)	C	PCB-48	(0.483)		PCB-56	[0.74]	J EMPC
PCB-9	(0.201)		PCB-25	(0.493)		PCB-44/47/65	[1.89]	J EMPC C	PCB-60	(0.515)	
PCB-7	(0.226)		PCB-31	1.08		PCB-59/62/75	(0.369)	C	PCB-80	(0.43)	
PCB-6	(0.192)		PCB-28/20	1.31	J C	PCB-42	(0.538)		PCB-79	(0.39)	
PCB-5	(0.234)		PCB-21/33	(0.56)	C	PCB-41	(0.621)		PCB-78	(0.458)	
PCB-8	0.667	J	PCB-22	(0.511)		PCB-71/40	0.803	J C	PCB-81	(0.48)	
PCB-14	(0.222)		PCB-36	(0.505)		PCB-64	0.897	J	PCB-77	(0.495)	
PCB-11	2.49	B	PCB-39	(0.555)							
PCB-13/12	(0.225)	C	PCB-38	(0.552)							
PCB-15	0.612	J	PCB-35	(0.572)							
			PCB-37	0.738	J						
Conc.	3.77		**Conc.**	4.04					**Conc.**	10.5	
EMPC	3.77		**EMPC**	4.04					**EMPC**	13.1	

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Totals	Conc.	EMPC
Mono-Tri	7.81	7.81
Tetra-Hexa	81.5	95
Hepta-Deca	69.3	75.3
Mono-Deca	159	178

Sample ID: GP-MW-11-SS — Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.172)		PCB-109/119/86/97/125/87	3.48	J C	PCB-155	(0.178)		PCB-165	(0.194)	
PCB-96	(0.175)		PCB-117	(0.285)		PCB-152	(0.166)		PCB-146	1.76	
PCB-103	(0.369)		PCB-116/85	[0.989]	J EMPC C	PCB-150	(0.191)		PCB-161	(0.171)	
PCB-94	(0.447)		PCB-110	8.42		PCB-136	[1.37]	EMPC	PCB-153/168	7.7	C
PCB-95	6.66		PCB-115	(0.227)		PCB-145	(0.174)		PCB-141	[1.26]	EMPC
PCB-100/93	(0.401)	C	PCB-82	(0.389)		PCB-148	(0.235)		PCB-130	[1]	EMPC
PCB-102	(0.288)		PCB-111	(0.275)		PCB-151/135	[3.12]	EMPC C	PCB-137	(0.249)	
PCB-98	(0.421)		PCB-120	(0.227)		PCB-154	(0.22)		PCB-164	0.721	J
PCB-88	(0.419)		PCB-108/124	(0.273)	C	PCB-144	(0.239)		PCB-163/138/129	9.61	C
PCB-91	1.32		PCB-107	0.444	J	PCB-147/149	8.34	C	PCB-160	(0.2)	
PCB-84	2.65		PCB-123	(0.277)		PCB-134	(0.273)		PCB-158	[0.752]	J EMPC
PCB-89	(0.386)		PCB-106	(0.263)		PCB-143	(0.256)		PCB-128/166	1.61	J C
PCB-121	(0.258)		PCB-118	4.25		PCB-139/140	(0.222)	C	PCB-159	(0.222)	
PCB-92	[1.29]	EMPC	PCB-122	(0.336)		PCB-131	(0.268)		PCB-162	(0.26)	
PCB-113/90/101	5.79	C	PCB-114	(0.275)		PCB-142	(0.264)		PCB-167	[0.354]	J EMPC
PCB-83	(0.477)		PCB-105	1.5		PCB-132	4.15		PCB-156/157	[0.729]	J EMPC C
PCB-99	2.62		PCB-127	(0.285)		PCB-133	(0.232)		PCB-169	(0.326)	
PCB-112	(0.237)		PCB-126	(0.243)							
			Conc.	37.1					**Conc.**	33.9	
			EMPC	39.4					**EMPC**	42.5	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.145)		PCB-174	2.71		PCB-202	1.56		PCB-208	6.23	
PCB-179	[0.942]	J EMPC	PCB-177	1.48		PCB-201	0.721	J	PCB-207	1.9	
PCB-184	(0.15)		PCB-181	(0.288)		PCB-204	(0.187)		PCB-206	17.5	
PCB-176	[0.388]	J EMPC	PCB-171/173	0.69	J C	PCB-197	(0.199)				
PCB-186	(0.132)		PCB-172	(0.335)		PCB-200	(0.207)		**Conc.**	25.7	
PCB-178	[0.861]	J EMPC	PCB-192	(0.228)		PCB-198/199	6.97	C	**EMPC**	25.7	
PCB-175	(0.323)		PCB-180/193	5.82	C	PCB-196	[1.77]	EMPC			
PCB-187	4.08		PCB-191	(0.262)		PCB-203	3.37		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.276)		PCB-170	[2.06]	EMPC	PCB-195	0.726	J	PCB-209	11.2	
PCB-183	1.62		PCB-190	(0.29)		PCB-194	2.7				
PCB-185	(0.358)		PCB-189	(0.259)		PCB-205	(0.387)				
			Conc.	16.4		**Conc.**	16				
			EMPC	20.7		**EMPC**	17.8				

Sample ID: GP-MW-12-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	9.85 g	Sample ID:	B3245_16683_PCB_002-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	89.3 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.607			ES PCB-1	53.4
PCB-81 344'5-TeCB	ND	0.596			ES PCB-3	62.4
PCB-105 233'44'-PeCB	3.83				ES PCB-4	64.5
PCB-114 2344'5-PeCB	ND	0.254			ES PCB-15	72.8
PCB-118 23'44'5-PeCB	8.51				ES PCB-19	72.3
PCB-123 23'44'5'-PeCB	ND	0.237			ES PCB-37	83.1
PCB-126 33'44'5-PeCB	ND	0.388			ES PCB-54	68.6
PCB-156/157 233'44'5/233'44'5'-HxCB	2			J C	ES PCB-77	84.4
PCB-167 23'44'55'-HxCB	0.977			J	ES PCB-81	85.4
PCB-169 33'44'55'-HxCB	ND	0.655			ES PCB-104	85.9
PCB-189 233'44'55'-HpCB	ND	0.84			ES PCB-105	98
					ES PCB-114	95.5
TEQs (WHO 2005 M/H)					ES PCB-118	98.6
					ES PCB-123	99.3
ND = 0	0.00046		0.00046		ES PCB-126	93.3
ND = 0.5 x DL	0.0298		0.0298		ES PCB-153	98.5
ND = DL	0.0592		0.0592		ES PCB-155	103
					ES PCB-156/157	109
Totals					ES PCB-167	102
Mono-CB			2.65		ES PCB-169	98.9
Di-CB	9.46				ES PCB-170	109
Tri-CB	9.79		11		ES PCB-180	106
Tetra-CB	19.4		23.3		ES PCB-188	100
Penta-CB	63.1		63.6		ES PCB-189	101
Hexa-CB	95.5		100		ES PCB-202	96.6
Hepta-CB	66.5		69.9		ES PCB-205	105
Octa-CB	25.8		29		ES PCB-206	118
Nona-CB	9.05				ES PCB-208	109
Deca-CB			3.45		ES PCB-209	120
					CS PCB-28	93.9
Total PCB (Mono-Deca)	299		321		CS PCB-111	97.1
					CS PCB-178	98

Checkcode: 711-719-JDY/C   SGS North America - PCB v0.83   Report Created: 21-May-2019 09:16   Analyst: ah

Sample ID: GP-MW-12-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	9.85 g	Sample ID:	B3245_16683_PCB_002-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	89.3 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019
		Units	pg/g	Checkcode:	711-719-JDY/C	Time Analyzed:	18:22:01

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	[2.65]	EMPC	PCB-19	(0.906)		PCB-54	(0.401)		PCB-72	(0.534)	
PCB-2	(0.557)		PCB-30/18	[1.17]	J EMPC C	PCB-50/53	(0.549)	C	PCB-68	(0.567)	
PCB-3	(0.595)		PCB-17	(0.972)		PCB-45	(0.645)		PCB-57	(0.56)	
			PCB-27	(0.691)		PCB-51	(0.557)		PCB-58	(0.503)	
Conc.	0		PCB-24	(0.676)		PCB-46	(0.693)		PCB-67	(0.508)	
EMPC	2.65		PCB-16	(1.02)		PCB-52	3.29		PCB-63	(0.614)	
			PCB-32	(0.629)		PCB-73	(0.423)		PCB-61/70/74/76	7.37	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.682)		PCB-43	(0.55)		PCB-66	[3.95]	EMPC
PCB-4	0.666	J	PCB-23	(0.677)		PCB-69/49	1.75	J C	PCB-55	(0.52)	
PCB-10	(0.333)		PCB-26/29	(0.665)	C	PCB-48	(0.587)		PCB-56	1.52	
PCB-9	(0.35)		PCB-25	(0.571)		PCB-44/47/65	2.81	J C	PCB-60	1.13	
PCB-7	(0.393)		PCB-31	2.29		PCB-59/62/75	(0.448)	C	PCB-80	(0.534)	
PCB-6	0.635	J	PCB-28/20	3.44	C	PCB-42	(0.654)		PCB-79	(0.483)	
PCB-5	(0.407)		PCB-21/33	1.45	J C	PCB-41	(0.755)		PCB-78	(0.567)	
PCB-8	2.79		PCB-22	0.855	J	PCB-71/40	(0.522)	C	PCB-81	(0.596)	
PCB-14	(0.387)		PCB-36	(0.585)		PCB-64	1.51		PCB-77	(0.607)	
PCB-11	4.09	B	PCB-39	(0.642)							
PCB-13/12	(0.391)	C	PCB-38	(0.639)							
PCB-15	1.27		PCB-35	(0.663)							
			PCB-37	1.75							
Conc.	9.46		**Conc.**	9.79					**Conc.**	19.4	
EMPC	9.46		**EMPC**	11					**EMPC**	23.3	

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Totals	Conc.	EMPC
Mono-Tri	19.2	23.1
Tetra-Hexa	178	187
Hepta-Deca	101	111
Mono-Deca	299	321

Sample ID: GP-MW-12-SS **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.193)		PCB-109/119/86/97/125/87	5.02	J C	PCB-155	(0.183)		PCB-165	(0.213)	
PCB-96	(0.197)		PCB-117	(0.244)		PCB-152	(0.171)		PCB-146	3.28	
PCB-103	(0.316)		PCB-116/85	1.98	J C	PCB-150	(0.196)		PCB-161	(0.188)	
PCB-94	(0.383)		PCB-110	16.3		PCB-136	3.16		PCB-153/168	14.2	C
PCB-95	8.18		PCB-115	(0.194)		PCB-145	(0.179)		PCB-141	3.19	
PCB-100/93	(0.344)	C	PCB-82	(0.334)		PCB-148	(0.257)		PCB-130	[1.45]	EMPC
PCB-102	(0.247)		PCB-111	(0.236)		PCB-151/135	8.06	C	PCB-137	[0.747]	J EMPC
PCB-98	(0.361)		PCB-120	(0.194)		PCB-154	(0.242)		PCB-164	[1.93]	EMPC
PCB-88	(0.359)		PCB-108/124	0.456	J C	PCB-144	(0.261)		PCB-163/138/129	25.3	C
PCB-91	1.56		PCB-107	[0.56]	J EMPC	PCB-147/149	20.4	C	PCB-160	(0.219)	
PCB-84	2.92		PCB-123	(0.237)		PCB-134	1.11		PCB-158	2.38	
PCB-89	(0.331)		PCB-106	(0.225)		PCB-143	(0.281)		PCB-128/166	4.19	C
PCB-121	(0.221)		PCB-118	8.51		PCB-139/140	[0.454]	J EMPC C	PCB-159	(0.362)	
PCB-92	1.72		PCB-122	(0.311)		PCB-131	(0.294)		PCB-162	(0.424)	
PCB-113/90/101	8.47	C	PCB-114	(0.254)		PCB-142	(0.289)		PCB-167	0.977	J
PCB-83	(0.409)		PCB-105	3.83		PCB-132	7.11		PCB-156/157	2	J C
PCB-99	4.16		PCB-127	(0.241)		PCB-133	(0.254)		PCB-169	(0.655)	
PCB-112	(0.203)		PCB-126	(0.388)							
			Conc.	63.1					**Conc.**	95.5	
			EMPC	63.6					**EMPC**	100	
Hepta	**Conc.**	**Qualifiers**	**Hepta**	**Conc.**	**Qualifiers**	**Octa**	**Conc.**	**Qualifiers**	**Nona**	**Conc.**	**Qualifiers**
PCB-188	(0.169)		PCB-174	8.22		PCB-202	[2.03]	EMPC	PCB-208	1.82	
PCB-179	4.02		PCB-177	5.29		PCB-201	[1.08]	EMPC	PCB-207	(0.928)	
PCB-184	(0.174)		PCB-181	(0.658)		PCB-204	(0.293)		PCB-206	7.23	
PCB-176	1.26		PCB-171/173	2.36	C	PCB-197	(0.313)				
PCB-186	(0.154)		PCB-172	[1.31]	EMPC	PCB-200	(0.326)		**Conc.**	9.05	
PCB-178	[2.05]	EMPC	PCB-192	(0.519)		PCB-198/199	8.83	C	**EMPC**	9.05	
PCB-175	(0.737)		PCB-180/193	17.8	C	PCB-196	3.47				
PCB-187	13.2		PCB-191	(0.598)		PCB-203	4.8		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.629)		PCB-170	7.6		PCB-195	2.18		PCB-209	[3.45]	EMPC
PCB-183	5.32		PCB-190	1.41		PCB-194	6.57				
PCB-185	(0.817)		PCB-189	(0.84)		PCB-205	(0.867)				
			Conc.	66.5		**Conc.**	25.8				
			EMPC	69.9		**EMPC**	29				

Sample ID: GP-MW-13-SS **Method 1668C**

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.04 g	Sample ID:	B3245_16683_PCB_004-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	84.6 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	1.89				ES PCB-1	47.9
PCB-81 344'5-TeCB	ND	0.745			ES PCB-3	56.4
PCB-105 233'44'-PeCB	9.56				ES PCB-4	60
PCB-114 2344'5-PeCB	0.61			J	ES PCB-15	71.5
PCB-118 23'44'5-PeCB	20.7				ES PCB-19	67.8
PCB-123 23'44'5'-PeCB	0.58			J	ES PCB-37	76.1
PCB-126 33'44'5-PeCB	ND	0.313			ES PCB-54	59.2
PCB-156/157 233'44'5/233'44'5'-HxCB	3.34			C	ES PCB-77	85.3
PCB-167 23'44'55'-HxCB	EMPC		1.23		ES PCB-81	84
PCB-169 33'44'55'-HxCB	ND	0.365			ES PCB-104	78.1
PCB-189 233'44'55'-HpCB	ND	0.462			ES PCB-105	102
					ES PCB-114	96.4
TEQs (WHO 2005 M/H)					ES PCB-118	98.7
					ES PCB-123	98.2
ND = 0	0.00123		0.00127		ES PCB-126	98.7
ND = 0.5 x DL	0.0225		0.0225		ES PCB-153	97.6
ND = DL	0.0437		0.0438		ES PCB-155	87.7
					ES PCB-156/157	117
Totals					ES PCB-167	107
Mono-CB	ND	0.806			ES PCB-169	113
Di-CB	5.63		10.5		ES PCB-170	96.3
Tri-CB	24.4		28.2		ES PCB-180	91.7
Tetra-CB	94.4		95.4		ES PCB-188	94.3
Penta-CB	158		159		ES PCB-189	106
Hexa-CB	140		146		ES PCB-202	103
Hepta-CB	67.4		70.3		ES PCB-205	114
Octa-CB	10.3		23.9		ES PCB-206	129
Nona-CB	7.46				ES PCB-208	105
Deca-CB	5.56				ES PCB-209	137
					CS PCB-28	85.8
Total PCB (Mono-Deca)	514		546		CS PCB-111	94.5
					CS PCB-178	101

Checkcode: 143-730-JNV/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: ah

Sample ID: GP-MW-13-SS

Method 1668C

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.04 g	Sample ID:	B3245_16683_PCB_004-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	84.6 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019
		Units	pg/g	Checkcode:	143-730-JNV/C	Time Analyzed:	19:19:27

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(0.801)		PCB-19	(1.48)		PCB-54	(0.508)		PCB-72	(0.668)	
PCB-2	(0.759)		PCB-30/18	4.1	C	PCB-50/53	1.81	J C	PCB-68	(0.709)	
PCB-3	(0.811)		PCB-17	[2.06]	EMPC	PCB-45	1.87		PCB-57	(0.7)	
			PCB-27	(1.13)		PCB-51	(0.642)		PCB-58	(0.628)	
Conc.	0		PCB-24	(1.11)		PCB-46	(0.799)		PCB-67	(0.635)	
EMPC	0		PCB-16	(1.66)		PCB-52	13.6		PCB-63	(0.767)	
			PCB-32	[1.73]	EMPC	PCB-73	(0.488)		PCB-61/70/74/76	20.4	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.763)		PCB-43	(0.634)		PCB-66	12.3	
PCB-4	0.969	J	PCB-23	(0.757)		PCB-69/49	7.4	C	PCB-55	(0.65)	
PCB-10	(0.368)		PCB-26/29	(0.744)	C	PCB-48	1.51		PCB-56	5.05	
PCB-9	(0.513)		PCB-25	(0.638)		PCB-44/47/65	11.8	C	PCB-60	2.61	
PCB-7	(0.577)		PCB-31	5.35		PCB-59/62/75	[0.975]	J EMPC C	PCB-80	(0.667)	
PCB-6	(0.491)		PCB-28/20	7.11	C	PCB-42	3.2		PCB-79	(0.604)	
PCB-5	(0.598)		PCB-21/33	2.76	C	PCB-41	(0.871)		PCB-78	(0.709)	
PCB-8	2.33		PCB-22	1.95		PCB-71/40	5.32	C	PCB-81	(0.745)	
PCB-14	(0.568)		PCB-36	(0.654)		PCB-64	5.63		PCB-77	1.89	
PCB-11	[4.88]	B EMPC	PCB-39	(0.718)							
PCB-13/12	(0.574)	C	PCB-38	(0.714)							
PCB-15	2.33		PCB-35	(0.741)							
			PCB-37	3.17							
Conc.	5.63		**Conc.**	24.4					**Conc.**	94.4	
EMPC	10.5		**EMPC**	28.2					**EMPC**	95.4	

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Totals	Conc.	EMPC
Mono-Tri	30.1	38.7
Tetra-Hexa	393	400
Hepta-Deca	90.8	107
Mono-Deca	514	546

Sample ID: GP-MW-13-SS

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.202)		PCB-109/119/86/97/125/87	14.2	C	PCB-155	(0.199)		PCB-165	(0.192)	
PCB-96	(0.206)		PCB-117	[0.527]	J EMPC	PCB-152	(0.185)		PCB-146	4.24	
PCB-103	(0.489)		PCB-116/85	4.65	C	PCB-150	(0.213)		PCB-161	(0.17)	
PCB-94	(0.592)		PCB-110	31.3		PCB-136	4.57		PCB-153/168	25.7	C
PCB-95	21.2		PCB-115	(0.301)		PCB-145	(0.194)		PCB-141	4.86	
PCB-100/93	(0.532)	C	PCB-82	3.03		PCB-148	(0.233)		PCB-130	2.58	
PCB-102	0.735	J	PCB-111	(0.365)		PCB-151/135	9.89	C	PCB-137	[1.5]	EMPC
PCB-98	(0.559)		PCB-120	(0.301)		PCB-154	(0.219)		PCB-164	2.56	
PCB-88	(0.556)		PCB-108/124	1.06	J C	PCB-144	[1.22]	EMPC	PCB-163/138/129	36.8	C
PCB-91	3.96		PCB-107	1.69		PCB-147/149	24.4	C	PCB-160	(0.198)	
PCB-84	7.17		PCB-123	0.58	J	PCB-134	[1.73]	EMPC	PCB-158	3.87	
PCB-89	(0.512)		PCB-106	(0.349)		PCB-143	(0.254)		PCB-128/166	5.66	C
PCB-121	(0.342)		PCB-118	20.7		PCB-139/140	0.677	J C	PCB-159	(0.256)	
PCB-92	4.44		PCB-122	(0.447)		PCB-131	(0.266)		PCB-162	(0.3)	
PCB-113/90/101	21.2	C	PCB-114	0.61	J	PCB-142	(0.262)		PCB-167	[1.23]	EMPC
PCB-83	1.64		PCB-105	9.56		PCB-132	11		PCB-156/157	3.34	C
PCB-99	10.6		PCB-127	(0.348)		PCB-133	(0.23)		PCB-169	(0.365)	
PCB-112	(0.314)		PCB-126	(0.313)							
			Conc.	158					**Conc.**	140	
			EMPC	159					**EMPC**	146	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.275)		PCB-174	8.24		PCB-202	1.95		PCB-208	1.76	
PCB-179	3.58		PCB-177	5.08		PCB-201	[1.08]	EMPC	PCB-207	(1.06)	
PCB-184	(0.284)		PCB-181	(0.455)		PCB-204	(0.357)		PCB-206	5.71	
PCB-176	1.34		PCB-171/173	2.53	C	PCB-197	(0.381)				
PCB-186	(0.251)		PCB-172	[1.37]	EMPC	PCB-200	(0.397)		**Conc.**	7.46	
PCB-178	1.98		PCB-192	(0.359)		PCB-198/199	[6.76]	EMPC C	**EMPC**	7.46	
PCB-175	(0.51)		PCB-180/193	19.2	C	PCB-196	3.26				
PCB-187	11.2		PCB-191	(0.414)		PCB-203	[3.9]	EMPC	**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.435)		PCB-170	9.38		PCB-195	[1.84]	EMPC	PCB-209	5.56	
PCB-183	4.88		PCB-190	[1.47]	EMPC	PCB-194	5.11				
PCB-185	(0.565)		PCB-189	(0.462)		PCB-205	(0.894)				
			Conc.	67.4		**Conc.**	10.3				
			EMPC	70.3		**EMPC**	23.9				

Sample ID: GP-MW-14-SS

Method 1668C

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	9.96 g	Sample ID:	B3245_16683_PCB_005-R1	Date Extracted:	15-May-2019
Date Collected:	25-Apr-2019	% Solid	89.3 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	EMPC		1	J	ES PCB-1	64.9
PCB-81 344'5-TeCB	ND	0.696			ES PCB-3	70.1
PCB-105 233'44'-PeCB	12.5				ES PCB-4	73.6
PCB-114 2344'5-PeCB	ND	0.301			ES PCB-15	75.6
PCB-118 23'44'5-PeCB	28				ES PCB-19	76.9
PCB-123 23'44'5'-PeCB	0.483			J	ES PCB-37	81.1
PCB-126 33'44'5-PeCB	ND	0.255			ES PCB-54	67.9
PCB-156/157 233'44'5/233'44'5'-HxCB	5.29			C	ES PCB-77	87.6
PCB-167 23'44'55'-HxCB	2.08				ES PCB-81	87.1
PCB-169 33'44'55'-HxCB	ND	0.422			ES PCB-104	82.2
PCB-189 233'44'55'-HpCB	ND	0.404			ES PCB-105	98.4
					ES PCB-114	95.9
TEQs (WHO 2005 M/H)					ES PCB-118	95.4
					ES PCB-123	96.5
ND = 0	0.00145		0.00155		ES PCB-126	98.8
ND = 0.5 x DL	0.0207		0.0208		ES PCB-153	94.1
ND = DL	0.0399		0.04		ES PCB-155	92.3
					ES PCB-156/157	116
Totals					ES PCB-167	106
Mono-CB	6.77		8.32		ES PCB-169	111
Di-CB	17.1				ES PCB-170	90.5
Tri-CB	24.1		29.9		ES PCB-180	87.2
Tetra-CB	84.6		87.7		ES PCB-188	95.5
Penta-CB	209		221		ES PCB-189	98.1
Hexa-CB	234		234		ES PCB-202	105
Hepta-CB	97.3		101		ES PCB-205	111
Octa-CB	47.2				ES PCB-206	131
Nona-CB	16.4				ES PCB-208	100
Deca-CB			4.51		ES PCB-209	130
					CS PCB-28	88
Total PCB (Mono-Deca)	736		768		CS PCB-111	96.7
					CS PCB-178	99.8

Checkcode: 575-042-MTY/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: ah

Sample ID: GP-MW-14-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245
Project ID:	Nord Door	Weight/Volume:	9.96 g	Sample ID:	B3245_16683_PCB_005-R1
Date Collected:	25-Apr-2019	% Solid	89.3 %	QC Batch No.:	16683
		Units	pg/g	Checkcode:	575-042-MTY/C

Date Received:	30-Apr-2019
Date Extracted:	15-May-2019
Date Analyzed:	19-May-2019
Time Analyzed:	20:16:54

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	3.89		PCB-19	(1.18)		PCB-54	(0.528)		PCB-72	(0.624)	
PCB-2	[1.55]	EMPC	PCB-30/18	[3]	EMPC C	PCB-50/53	1.46	J C	PCB-68	(0.663)	
PCB-3	2.88		PCB-17	[1.9]	EMPC	PCB-45	1.06		PCB-57	(0.654)	
			PCB-27	(0.901)		PCB-51	(0.663)		PCB-58	(0.587)	
Conc.	6.77		PCB-24	(0.882)		PCB-46	(0.826)		PCB-67	(0.593)	
EMPC	8.32		PCB-16	(1.33)		PCB-52	15.6		PCB-63	(0.717)	
			PCB-32	1.86		PCB-73	(0.504)		PCB-61/70/74/76	19.6	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.895)		PCB-43	(0.655)		PCB-66	11.1	
PCB-4	0.998	J	PCB-23	(0.888)		PCB-69/49	5.96	C	PCB-55	(0.608)	
PCB-10	(0.243)		PCB-26/29	[0.868]	J EMPC C	PCB-48	[1.19]	EMPC	PCB-56	4.75	
PCB-9	(0.406)		PCB-25	(0.748)		PCB-44/47/65	9.96	C	PCB-60	2.76	
PCB-7	(0.456)		PCB-31	5.56		PCB-59/62/75	[0.92]	J EMPC C	PCB-80	(0.624)	
PCB-6	0.986	J	PCB-28/20	7.55	C	PCB-42	2.53		PCB-79	(0.564)	
PCB-5	(0.472)		PCB-21/33	3.19	C	PCB-41	(0.9)		PCB-78	(0.663)	
PCB-8	3.06		PCB-22	2.09		PCB-71/40	3.9	C	PCB-81	(0.696)	
PCB-14	(0.449)		PCB-36	(0.767)		PCB-64	5.89		PCB-77	[1]	J EMPC
PCB-11	8.15	B	PCB-39	(0.842)							
PCB-13/12	0.556	J C	PCB-38	(0.838)							
PCB-15	3.38		PCB-35	(0.869)							
			PCB-37	3.89							
Conc.	17.1		**Conc.**	24.1					**Conc.**	84.6	
EMPC	17.1		**EMPC**	29.9					**EMPC**	87.7	

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Totals	Conc.	EMPC
Mono-Tri	48.1	55.4
Tetra-Hexa	527	543
Hepta-Deca	161	170
Mono-Deca	736	768

Sample ID: GP-MW-14-SS — Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.226)		PCB-109/119/86/97/125/87	20.8	C	PCB-155	(0.22)		PCB-165	(0.258)	
PCB-96	(0.23)		PCB-117	[0.668]	J EMPC	PCB-152	(0.205)		PCB-146	5.5	
PCB-103	(0.391)		PCB-116/85	5.37	C	PCB-150	(0.235)		PCB-161	(0.227)	
PCB-94	(0.473)		PCB-110	43.9		PCB-136	6.62		PCB-153/168	42.4	C
PCB-95	30.9		PCB-115	(0.24)		PCB-145	(0.214)		PCB-141	9.48	
PCB-100/93	(0.425)	C	PCB-82	3.56		PCB-148	(0.312)		PCB-130	3.68	
PCB-102	0.777	J	PCB-111	(0.291)		PCB-151/135	15.9	C	PCB-137	3.52	
PCB-98	(0.446)		PCB-120	(0.24)		PCB-154	(0.293)		PCB-164	3.59	
PCB-88	(0.444)		PCB-108/124	1.25	J C	PCB-144	2.44		PCB-163/138/129	58.1	C
PCB-91	4.88		PCB-107	[1.96]	EMPC	PCB-147/149	38.6	C	PCB-160	(0.266)	
PCB-84	[9.43]	EMPC	PCB-123	0.483	J	PCB-134	2.99		PCB-158	6.39	
PCB-89	(0.409)		PCB-106	(0.279)		PCB-143	(0.34)		PCB-128/166	8.72	C
PCB-121	(0.273)		PCB-118	28		PCB-139/140	[0.809]	J EMPC C	PCB-159	(0.281)	
PCB-92	6.72		PCB-122	(0.368)		PCB-131	0.734	J	PCB-162	(0.33)	
PCB-113/90/101	34.1	C	PCB-114	(0.301)		PCB-142	(0.351)		PCB-167	2.08	
PCB-83	1.81		PCB-105	12.5		PCB-132	17.5		PCB-156/157	5.29	C
PCB-99	14		PCB-127	(0.284)		PCB-133	(0.308)		PCB-169	(0.422)	
PCB-112	(0.251)		PCB-126	(0.255)							
			Conc.	209					**Conc.**	234	
			EMPC	221					**EMPC**	234	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.22)		PCB-174	12		PCB-202	3.9		PCB-208	3.72	
PCB-179	5.39		PCB-177	6.42		PCB-201	2.16		PCB-207	(1.11)	
PCB-184	(0.227)		PCB-181	(0.422)		PCB-204	(0.215)		PCB-206	12.7	
PCB-176	1.73		PCB-171/173	4.02	C	PCB-197	(0.23)				
PCB-186	(0.2)		PCB-172	[1.38]	EMPC	PCB-200	1.38		**Conc.**	16.4	
PCB-178	[2.35]	EMPC	PCB-192	(0.333)		PCB-198/199	14.7	C	**EMPC**	16.4	
PCB-175	[0.438]	J EMPC	PCB-180/193	27.4	C	PCB-196	5.06				
PCB-187	15.1		PCB-191	(0.384)		PCB-203	7.37		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.403)		PCB-170	13.9		PCB-195	2.69		PCB-209	[4.51]	EMPC
PCB-183	7.78		PCB-190	2.41		PCB-194	9.96				
PCB-185	1.11		PCB-189	(0.404)		PCB-205	(1.02)				
			Conc.	97.3		**Conc.**	47.2				
			EMPC	101		**EMPC**	47.2				

Sample ID: GP-MW-15-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.04 g	Sample ID:	B3245_16683_PCB_006-R1	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	72.2 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	8.19				ES PCB-1	59.8
PCB-81 344'5-TeCB	ND	0.921			ES PCB-3	70.1
PCB-105 233'44'-PeCB	52.1				ES PCB-4	71.5
PCB-114 2344'5-PeCB	3.1				ES PCB-15	76.7
PCB-118 23'44'5-PeCB	91.1				ES PCB-19	76.5
PCB-123 23'44'5'-PeCB	2.78				ES PCB-37	77.4
PCB-126 33'44'5-PeCB	ND	0.685			ES PCB-54	74.1
PCB-156/157 233'44'5/233'44'5'-HxCB	12.7			C	ES PCB-77	77.8
PCB-167 23'44'55'-HxCB	5.21				ES PCB-81	77.2
PCB-169 33'44'55'-HxCB	ND	1.1			ES PCB-104	91.9
PCB-189 233'44'55'-HpCB	ND	0.899			ES PCB-105	88.8
					ES PCB-114	87.1
TEQs (WHO 2005 M/H)					ES PCB-118	89.2
					ES PCB-123	93.7
ND = 0	0.00583		0.00583		ES PCB-126	85.1
ND = 0.5 x DL	0.0567		0.0567		ES PCB-153	97.6
ND = DL	0.108		0.108		ES PCB-155	108
					ES PCB-156/157	106
Totals					ES PCB-167	99
Mono-CB	10.6				ES PCB-169	99.1
Di-CB	21.7				ES PCB-170	102
Tri-CB	134				ES PCB-180	94.5
Tetra-CB	661		669		ES PCB-188	102
Penta-CB	879		887		ES PCB-189	97.4
Hexa-CB	791		808		ES PCB-202	99.4
Hepta-CB	419		439		ES PCB-205	109
Octa-CB	172		177		ES PCB-206	132
Nona-CB	66.9				ES PCB-208	105
Deca-CB	28.1				ES PCB-209	132
					CS PCB-28	96.8
Total PCB (Mono-Deca)	3,180		3,240		CS PCB-111	93.4
					CS PCB-178	104

Checkcode: 882-041-MWZ/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: ah

Sample ID: GP-MW-15-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.04 g	Sample ID:	B3245_16683_PCB_006-R1	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	72.2 %	QC Batch No.:	16683	Date Analyzed:	19-May-2019
		Units	pg/g	Checkcode:	882-041-MWZ/C	Time Analyzed:	21:14:20

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	2.37		PCB-19	(1.29)		PCB-54	(0.408)		PCB-72	(0.826)	
PCB-2	4.26		PCB-30/18	11.1	C	PCB-50/53	9.83	C	PCB-68	(0.877)	
PCB-3	3.94		PCB-17	6.51		PCB-45	9.89		PCB-57	(0.866)	
			PCB-27	(0.981)		PCB-51	[2.29]	EMPC	PCB-58	1.51	
Conc.	10.6		PCB-24	(0.96)		PCB-46	[3.74]	EMPC	PCB-67	1.4	
EMPC	10.6		PCB-16	4.87		PCB-52	87.6		PCB-63	4.04	
			PCB-32	7.19		PCB-73	(0.565)		PCB-61/70/74/76	142	C
Di	**Conc.**	**Qualifiers**	PCB-34	(1)		PCB-43	[2.22]	EMPC	PCB-66	68.3	
PCB-4	1.11		PCB-23	(0.996)		PCB-69/49	46.2	C	PCB-55	(0.804)	
PCB-10	(0.261)		PCB-26/29	3.45	C	PCB-48	16.6		PCB-56	41.3	
PCB-9	(0.268)		PCB-25	1.6		PCB-44/47/65	77.1	C	PCB-60	23.9	
PCB-7	(0.301)		PCB-31	29.1		PCB-59/62/75	6.41	C	PCB-80	(0.825)	
PCB-6	0.941	J	PCB-28/20	34.6	C	PCB-42	21.6		PCB-79	(0.747)	
PCB-5	(0.312)		PCB-21/33	15.3	C	PCB-41	5.47		PCB-78	(0.877)	
PCB-8	3.93		PCB-22	9.27		PCB-71/40	41.2	C	PCB-81	(0.921)	
PCB-14	0.343	J	PCB-36	(0.86)		PCB-64	48.1		PCB-77	8.19	
PCB-11	8.38	B	PCB-39	(0.945)							
PCB-13/12	2.82	C	PCB-38	(0.94)							
PCB-15	4.19		PCB-35	(0.974)							
			PCB-37	11.2							
Conc.	21.7		**Conc.**	134					**Conc.**	661	
EMPC	21.7		**EMPC**	134					**EMPC**	669	

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Totals	**Conc.**	**EMPC**
Mono-Tri	166	166
Tetra-Hexa	2,330	2,360
Hepta-Deca	686	711
Mono-Deca	3,180	3,240

Sample ID: GP-MW-15-SS Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.253)		PCB-109/119/86/97/125/87	88.3	C	PCB-155	(0.226)		PCB-165	(0.277)	
PCB-96	[1.76]	EMPC	PCB-117	3.92		PCB-152	(0.21)		PCB-146	25.4	
PCB-103	1.85		PCB-116/85	28.1	C	PCB-150	(0.242)		PCB-161	(0.244)	
PCB-94	(0.489)		PCB-110	149		PCB-136	25.7		PCB-153/168	154	C
PCB-95	107		PCB-115	(0.248)		PCB-145	(0.22)		PCB-141	32.4	
PCB-100/93	[1.94]	J EMPC C	PCB-82	19		PCB-148	(0.335)		PCB-130	11.9	
PCB-102	4.17		PCB-111	(0.301)		PCB-151/135	69.1	C	PCB-137	[4.55]	EMPC
PCB-98	[0.715]	J EMPC	PCB-120	(0.248)		PCB-154	4.04		PCB-164	[9.21]	EMPC
PCB-88	(0.459)		PCB-108/124	[3.85]	EMPC C	PCB-144	9.07		PCB-163/138/129	170	C
PCB-91	28		PCB-107	7.98		PCB-147/149	159	C	PCB-160	(0.285)	
PCB-84	41.9		PCB-123	2.78		PCB-134	9.86		PCB-158	16.5	
PCB-89	2.5		PCB-106	(0.288)		PCB-143	(0.365)		PCB-128/166	22.5	C
PCB-121	(0.282)		PCB-118	91.1		PCB-139/140	[1.66]	J EMPC C	PCB-159	[1.35]	EMPC
PCB-92	28.5		PCB-122	2.46		PCB-131	1.91		PCB-162	(0.812)	
PCB-113/90/101	147	C	PCB-114	3.1		PCB-142	(0.377)		PCB-167	5.21	
PCB-83	6.41		PCB-105	52.1		PCB-132	58.8		PCB-156/157	12.7	C
PCB-99	64.7		PCB-127	(0.291)		PCB-133	2.84		PCB-169	(1.1)	
PCB-112	(0.259)		PCB-126	(0.685)							
			Conc.	879					**Conc.**	791	
			EMPC	887					**EMPC**	808	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.205)		PCB-174	54		PCB-202	13.5		PCB-208	15.7	
PCB-179	22.5		PCB-177	31.5		PCB-201	7.92		PCB-207	5.6	
PCB-184	(0.212)		PCB-181	(0.919)		PCB-204	(0.323)		PCB-206	45.5	
PCB-176	8.27		PCB-171/173	[14]	EMPC C	PCB-197	1.58				
PCB-186	(0.187)		PCB-172	8.68		PCB-200	[5.12]	EMPC	**Conc.**	66.9	
PCB-178	13.2		PCB-192	(0.725)		PCB-198/199	53.1	C	**EMPC**	66.9	
PCB-175	2.64		PCB-180/193	113	C	PCB-196	20.9				
PCB-187	76.9		PCB-191	[1.42]	EMPC	PCB-203	30.1		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.879)		PCB-170	45.8		PCB-195	10.3		PCB-209	28.1	
PCB-183	35.2		PCB-190	7.31		PCB-194	34.4				
PCB-185	[5.22]	EMPC	PCB-189	(0.899)		PCB-205	(1.23)				
			Conc.	419		**Conc.**	172				
			EMPC	439		**EMPC**	177				

Sample ID: GP-MW-16-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**		
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.07 g	Sample ID:	B3245_16683_PCB_007-R1-D2	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	86.8 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	12.5				ES PCB-1	54.5
PCB-81 344'5-TeCB	ND	2.12			ES PCB-3	68.9
PCB-105 233'44'-PeCB	71.6				ES PCB-4	70
PCB-114 2344'5-PeCB	4.08				ES PCB-15	82.5
PCB-118 23'44'5-PeCB	187				ES PCB-19	81.5
PCB-123 23'44'5'-PeCB	EMPC		3.28		ES PCB-37	78.9
PCB-126 33'44'5-PeCB	EMPC		8.27		ES PCB-54	79.6
PCB-156/157 233'44'5/233'44'5'-HxCB	52.9			C	ES PCB-77	66.4
PCB-167 23'44'55'-HxCB	33.8				ES PCB-81	66.2
PCB-169 33'44'55'-HxCB	ND	3.47			ES PCB-104	113
PCB-189 233'44'55'-HpCB	EMPC		7.51		ES PCB-105	77.6
					ES PCB-114	76.6
TEQs (WHO 2005 M/H)					ES PCB-118	79.1
					ES PCB-123	83.3
ND = 0	0.0117		0.839		ES PCB-126	59.4
ND = 0.5 x DL	0.224		0.892		ES PCB-153	106
ND = DL	0.436		0.944		ES PCB-155	136
					ES PCB-156/157	88.6
Totals					ES PCB-167	89.5
Mono-CB	4.78		8.56		ES PCB-169	73.5
Di-CB	37.5				ES PCB-170	105
Tri-CB	188		192		ES PCB-180	115
Tetra-CB	653		657		ES PCB-188	116
Penta-CB	2,020		2,040		ES PCB-189	96.9
Hexa-CB	2,480		2,480		ES PCB-202	87.5
Hepta-CB	1,280		1,290		ES PCB-205	108
Octa-CB	223		274		ES PCB-206	123
Nona-CB	67.4				ES PCB-208	108
Deca-CB	21.8				ES PCB-209	130
					CS PCB-28	103
Total PCB (Mono-Deca)	6,980		7,070		CS PCB-111	92.8
					CS PCB-178	109

Checkcode: 778-496-NFL/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:17 Analyst: ah

Sample ID: GP-MW-16-SS Method 1668C

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.07 g	Sample ID:	B3245_16683_PCB_007-R1-D2	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	86.8 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019
		Units	pg/g	Checkcode:	778-496-NFL/C	Time Analyzed:	13:13:45

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	[3.78]	EMPC	PCB-19	2.66		PCB-54	(0.661)		PCB-72	(1.83)	
PCB-2	(0.859)		PCB-30/18	21.2	C	PCB-50/53	19.1	C	PCB-68	(1.97)	
PCB-3	4.78		PCB-17	11.6		PCB-45	15.2		PCB-57	(1.95)	
			PCB-27	[1.87]	EMPC	PCB-51	[3.84]	EMPC	PCB-58	(1.75)	
Conc.	4.78		PCB-24	(1.06)		PCB-46	10.1		PCB-67	(1.78)	
EMPC	8.56		PCB-16	10.7		PCB-52	133		PCB-63	(2.13)	
			PCB-32	7.35		PCB-73	(1.02)		PCB-61/70/74/76	116	C
Di	**Conc.**	**Qualifiers**	PCB-34	(1.47)		PCB-43	(1.3)		PCB-66	60.3	
PCB-4	3.95		PCB-23	(1.48)		PCB-69/49	43.3	C	PCB-55	(1.79)	
PCB-10	(0.522)		PCB-26/29	5.96	C	PCB-48	11.4		PCB-56	26.5	
PCB-9	(0.377)		PCB-25	[2.13]	EMPC	PCB-44/47/65	79.2	C	PCB-60	18	
PCB-7	(0.42)		PCB-31	35.1		PCB-59/62/75	8.13	C	PCB-80	(1.86)	
PCB-6	2.03		PCB-28/20	42.5	C	PCB-42	19.8		PCB-79	2.98	
PCB-5	(0.433)		PCB-21/33	20.8	C	PCB-41	6.98		PCB-78	(1.99)	
PCB-8	10.4		PCB-22	12.1		PCB-71/40	33.6	C	PCB-81	(2.12)	
PCB-14	(0.424)		PCB-36	(1.26)		PCB-64	37.2		PCB-77	12.5	
PCB-11	7.08	B	PCB-39	(1.39)							
PCB-13/12	2.77	C	PCB-38	(1.38)							
PCB-15	11.4		PCB-35	(1.43)							
			PCB-37	18							
Conc.	37.5		**Conc.**	188					**Conc.**	653	
EMPC	37.5		**EMPC**	192					**EMPC**	657	

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Totals	Conc.	EMPC
Mono-Tri	230	238
Tetra-Hexa	5,150	5,180
Hepta-Deca	1,600	1,660
Mono-Deca	6,980	7,070

Sample ID: GP-MW-16-SS

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.344)		PCB-109/119/86/97/125/87	171	C	PCB-155	(0.415)		PCB-165	(0.682)	
PCB-96	2.78		PCB-117	4.05		PCB-152	(0.389)		PCB-146	83.4	
PCB-103	2.93		PCB-116/85	41.7	C	PCB-150	(0.441)		PCB-161	(0.58)	
PCB-94	(2.18)		PCB-110	363		PCB-136	77.4		PCB-153/168	379	C
PCB-95	391		PCB-115	(1.29)		PCB-145	(0.41)		PCB-141	97.8	
PCB-100/93	(1.94)	C	PCB-82	31.3		PCB-148	(0.812)		PCB-130	46.9	
PCB-102	12.1		PCB-111	(1.37)		PCB-151/135	214	C	PCB-137	24.5	
PCB-98	(1.94)		PCB-120	(1.11)		PCB-154	8.81		PCB-164	30.7	
PCB-88	(2.05)		PCB-108/124	12.5	C	PCB-144	30.5		PCB-163/138/129	518	C
PCB-91	59		PCB-107	19.5		PCB-147/149	488	C	PCB-160	(0.662)	
PCB-84	136		PCB-123	[3.28]	EMPC	PCB-134	33.9		PCB-158	50.8	
PCB-89	5.87		PCB-106	(1.26)		PCB-143	(0.849)		PCB-128/166	76.1	C
PCB-121	(1.24)		PCB-118	187		PCB-139/140	11.5	C	PCB-159	4.24	
PCB-92	65.6		PCB-122	[3.15]	EMPC	PCB-131	[7.04]	EMPC	PCB-162	(2.21)	
PCB-113/90/101	319	C	PCB-114	4.08		PCB-142	(0.921)		PCB-167	33.8	
PCB-83	22.9		PCB-105	71.6		PCB-132	203		PCB-156/157	52.9	C
PCB-99	99.7		PCB-127	(1.44)		PCB-133	9.72		PCB-169	(3.47)	
PCB-112	(1.21)		PCB-126	[8.27]	EMPC						
			Conc.	2,020					**Conc.**	2,480	
			EMPC	2,040					**EMPC**	2,480	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.466)		PCB-174	179		PCB-202	[19]	EMPC	PCB-208	15.3	
PCB-179	51.8		PCB-177	99.5		PCB-201	14.8		PCB-207	5.8	
PCB-184	(0.476)		PCB-181	(2.37)		PCB-204	(0.531)		PCB-206	46.3	
PCB-176	20		PCB-171/173	54.3	C	PCB-197	(0.58)				
PCB-186	(0.42)		PCB-172	29.8		PCB-200	9.48		**Conc.**	67.4	
PCB-178	30.6		PCB-192	(1.84)		PCB-198/199	66.9	C	**EMPC**	67.4	
PCB-175	7.03		PCB-180/193	321	C	PCB-196	37.6				
PCB-187	186		PCB-191	5.27		PCB-203	[32.4]	EMPC	**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.23)		PCB-170	159		PCB-195	22.9		PCB-209	21.8	
PCB-183	109		PCB-190	19.7		PCB-194	71.1				
PCB-185	12.8		PCB-189	[7.51]	EMPC	PCB-205	(2.73)				
			Conc.	1,280		**Conc.**	223				
			EMPC	1,290		**EMPC**	274				

Sample ID: GP-MW-17-SS Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.07 g	Sample ID:	B3245_16683_PCB_008-R1-RJ	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	83.5 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.74			ES PCB-1	45
PCB-81 344'5-TeCB	ND	0.831			ES PCB-3	59.6
PCB-105 233'44'-PeCB	2.42				ES PCB-4	63.3
PCB-114 2344'5-PeCB	ND	0.475			ES PCB-15	74.5
PCB-118 23'44'5-PeCB	5.86				ES PCB-19	72
PCB-123 23'44'5'-PeCB	ND	0.532			ES PCB-37	80.6
PCB-126 33'44'5-PeCB	ND	0.65			ES PCB-54	64.7
PCB-156/157 233'44'5/233'44'5'-HxCB	2.48			C	ES PCB-77	77.5
PCB-167 23'44'55'-HxCB	EMPC		1.59		ES PCB-81	77.6
PCB-169 33'44'55'-HxCB	ND	1.57			ES PCB-104	84.9
PCB-189 233'44'55'-HpCB	ND	1.44			ES PCB-105	94.1
					ES PCB-114	97.4
TEQs (WHO 2005 M/H)					ES PCB-118	94.4
					ES PCB-123	92.7
ND = 0	0.000323		0.00037		ES PCB-126	91.4
ND = 0.5 x DL	0.0566		0.0566		ES PCB-153	100
ND = DL	0.113		0.113		ES PCB-155	102
					ES PCB-156/157	117
Totals					ES PCB-167	103
Mono-CB	14.9				ES PCB-169	96.5
Di-CB	9.92				ES PCB-170	96.7
Tri-CB	4.98		6.64		ES PCB-180	90.3
Tetra-CB	18.5		21.3		ES PCB-188	105
Penta-CB	42		45		ES PCB-189	100
Hexa-CB	128		137		ES PCB-202	98.8
Hepta-CB	91		103		ES PCB-205	111
Octa-CB	24.2		27.1		ES PCB-206	130
Nona-CB	ND	3.19			ES PCB-208	107
Deca-CB	ND	1.81			ES PCB-209	145
					CS PCB-28	96.6
Total PCB (Mono-Deca)	333		365		CS PCB-111	102
					CS PCB-178	106

Checkcode: 653-026-ZFL/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:17 Analyst: ah

Sample ID: GP-MW-17-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.07 g	Sample ID:	B3245_16683_PCB_008-R1-RJ	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	83.5 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019
		Units	pg/g	Checkcode:	653-026-ZFL/C	Time Analyzed:	14:11:16

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	14.9		PCB-19	(1.87)		PCB-54	(0.772)		PCB-72	(0.716)	
PCB-2	(0.767)		PCB-30/18	(1.34)	C	PCB-50/53	(0.95)	C	PCB-68	(0.773)	
PCB-3	(0.824)		PCB-17	(1.96)		PCB-45	(1.14)		PCB-57	(0.765)	
			PCB-27	(1.4)		PCB-51	(0.939)		PCB-58	(0.684)	
Conc.	14.9		PCB-24	(1.36)		PCB-46	(1.2)		PCB-67	(0.697)	
EMPC	14.9		PCB-16	(2.02)		PCB-52	3.05		PCB-63	(0.836)	
			PCB-32	(1.27)		PCB-73	(0.728)		PCB-61/70/74/76	6.03	C
Di	**Conc.**	**Qualifiers**	PCB-34	(1.29)		PCB-43	(0.924)		PCB-66	3.32	
PCB-4	1.07		PCB-23	(1.3)		PCB-69/49	[1.66]	J EMPC C	PCB-55	(0.701)	
PCB-10	(0.338)		PCB-26/29	(1.28)	C	PCB-48	(1.01)		PCB-56	[1.18]	EMPC
PCB-9	(0.443)		PCB-25	(1.1)		PCB-44/47/65	3.32	C	PCB-60	(0.884)	
PCB-7	(0.494)		PCB-31	2.2		PCB-59/62/75	(0.754)	C	PCB-80	(0.73)	
PCB-6	(0.423)		PCB-28/20	2.79	C	PCB-42	(1.1)		PCB-79	(0.681)	
PCB-5	(0.508)		PCB-21/33	(1.25)	C	PCB-41	(1.24)		PCB-78	(0.779)	
PCB-8	1.46		PCB-22	(1.13)		PCB-71/40	1.15	J C	PCB-81	(0.831)	
PCB-14	(0.497)		PCB-36	(1.1)		PCB-64	1.59		PCB-77	(0.74)	
PCB-11	5.61	B	PCB-39	(1.22)							
PCB-13/12	(0.492)	C	PCB-38	(1.21)							
PCB-15	1.78		PCB-35	(1.26)							
			PCB-37	[1.66]	EMPC						
Conc.	9.92		**Conc.**	4.98					**Conc.**	18.5	
EMPC	9.92		**EMPC**	6.64					**EMPC**	21.3	

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Totals	**Conc.**	**EMPC**
Mono-Tri	29.8	31.4
Tetra-Hexa	188	203
Hepta-Deca	115	130
Mono-Deca	333	365

Sample ID: GP-MW-17-SS

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.403)		PCB-109/119/86/97/125/87	3.78	J C	PCB-155	(0.394)		PCB-165	(0.5)	
PCB-96	(0.406)		PCB-117	(0.566)		PCB-152	(0.37)		PCB-146	5.15	
PCB-103	(0.686)		PCB-116/85	[1.95]	J EMPC C	PCB-150	(0.42)		PCB-161	(0.425)	
PCB-94	(0.837)		PCB-110	12.4		PCB-136	[2.65]	EMPC	PCB-153/168	23.1	C
PCB-95	5.3		PCB-115	(0.498)		PCB-145	(0.39)		PCB-141	[2.48]	EMPC
PCB-100/93	(0.745)	C	PCB-82	(0.74)		PCB-148	(0.596)		PCB-130	[2.65]	EMPC
PCB-102	(0.555)		PCB-111	(0.528)		PCB-151/135	5.13	C	PCB-137	2.21	
PCB-98	(0.747)		PCB-120	(0.428)		PCB-154	(0.564)		PCB-164	3.67	
PCB-88	(0.787)		PCB-108/124	(0.517)	C	PCB-144	(0.602)		PCB-163/138/129	39.6	C
PCB-91	1.33		PCB-107	0.667	J	PCB-147/149	23.3	C	PCB-160	(0.486)	
PCB-84	[1.11]	EMPC	PCB-123	(0.532)		PCB-134	(0.721)		PCB-158	4.12	
PCB-89	(0.713)		PCB-106	(0.486)		PCB-143	(0.623)		PCB-128/166	8.23	C
PCB-121	(0.477)		PCB-118	5.86		PCB-139/140	0.887	J C	PCB-159	(0.811)	
PCB-92	1.22		PCB-122	(0.566)		PCB-131	(0.664)		PCB-162	(0.946)	
PCB-113/90/101	6.01	C	PCB-114	(0.475)		PCB-142	(0.676)		PCB-167	[1.59]	EMPC
PCB-83	(0.924)		PCB-105	2.42		PCB-132	9.89		PCB-156/157	2.48	C
PCB-99	3.05		PCB-127	(0.464)		PCB-133	(0.592)		PCB-169	(1.57)	
PCB-112	(0.464)		PCB-126	(0.65)							
			Conc.	42					**Conc.**	128	
			EMPC	45					**EMPC**	137	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.434)		PCB-174	12.8		PCB-202	(1.5)		PCB-208	(1.85)	
PCB-179	3.57		PCB-177	7.84		PCB-201	(1.7)		PCB-207	(1.89)	
PCB-184	(0.444)		PCB-181	(1.54)		PCB-204	(1.46)		PCB-206	(4.54)	
PCB-176	1.09		PCB-171/173	3.84	C	PCB-197	(1.6)				
PCB-186	(0.391)		PCB-172	2.22		PCB-200	(1.57)		**Conc.**	0	
PCB-178	2.73		PCB-192	(1.2)		PCB-198/199	8.61	C	**EMPC**	0	
PCB-175	(1.73)		PCB-180/193	28.4	C	PCB-196	3.69				
PCB-187	17.8		PCB-191	(1.38)		PCB-203	5.77		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.45)		PCB-170	[11.8]	EMPC	PCB-195	[2.87]	EMPC	PCB-209	(1.81)	
PCB-183	8.19		PCB-190	2.52		PCB-194	6.16				
PCB-185	(1.88)		PCB-189	(1.44)		PCB-205	(2.64)				
			Conc.	91		**Conc.**	24.2				
			EMPC	103		**EMPC**	27.1				

Sample ID: GP-801-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.06 g	Sample ID:	B3245_16683_PCB_009-R1-RJ	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	83.3 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	EMPC		3.24		ES PCB-1	37.6
PCB-81 344'5-TeCB	ND	0.636			ES PCB-3	49.2
PCB-105 233'44'-PeCB	14.3				ES PCB-4	51.1
PCB-114 2344'5-PeCB	EMPC		0.694	J	ES PCB-15	75.9
PCB-118 23'44'5-PeCB	44				ES PCB-19	65.6
PCB-123 23'44'5'-PeCB	1.17				ES PCB-37	80
PCB-126 33'44'5-PeCB	ND	0.319			ES PCB-54	61
PCB-156/157 233'44'5/233'44'5'-HxCB	9.66			C	ES PCB-77	86.1
PCB-167 23'44'55'-HxCB	4.19				ES PCB-81	86.9
PCB-169 33'44'55'-HxCB	ND	0.444			ES PCB-104	75.3
PCB-189 233'44'55'-HpCB	1.49				ES PCB-105	103
					ES PCB-114	97.5
TEQs (WHO 2005 M/H)					ES PCB-118	98.5
					ES PCB-123	99.1
ND = 0	0.00225		0.00259		ES PCB-126	96.1
ND = 0.5 x DL	0.025		0.0253		ES PCB-153	99.8
ND = DL	0.0478		0.0481		ES PCB-155	96.2
					ES PCB-156/157	119
Totals					ES PCB-167	114
Mono-CB	ND	0.779			ES PCB-169	119
Di-CB	12.8				ES PCB-170	99.2
Tri-CB	59.7		65.8		ES PCB-180	94
Tetra-CB	194		212		ES PCB-188	99.6
Penta-CB	504		516		ES PCB-189	101
Hexa-CB	669		671		ES PCB-202	104
Hepta-CB	276		284		ES PCB-205	113
Octa-CB	64.2		66.2		ES PCB-206	126
Nona-CB	8.14				ES PCB-208	105
Deca-CB	4.76				ES PCB-209	133
					CS PCB-28	97.4
Total PCB (Mono-Deca)	1,790		1,840		CS PCB-111	101
					CS PCB-178	112

Checkcode: 308-818-VBT/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:17 Analyst: ah

Sample ID: GP-801-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.06 g	Sample ID:	B3245_16683_PCB_009-R1-RJ	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	83.3 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019
		Units	pg/g	Checkcode:	308-818-VBT/C	Time Analyzed:	15:08:49

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(0.827)		PCB-19	(1.36)		PCB-54	(0.378)		PCB-72	[1.24]	EMPC
PCB-2	(0.682)		PCB-30/18	6.38	C	PCB-50/53	4.92	C	PCB-68	1.61	
PCB-3	(0.732)		PCB-17	4.34		PCB-45	[3.78]	EMPC	PCB-57	(0.586)	
			PCB-27	(1.01)		PCB-51	[1.11]	EMPC	PCB-58	(0.524)	
Conc.	0		PCB-24	(0.984)		PCB-46	2.21		PCB-67	(0.534)	
EMPC	0		PCB-16	3.04		PCB-52	26.1		PCB-63	(0.641)	
			PCB-32	4.79		PCB-73	(0.397)		PCB-61/70/74/76	37.9	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.893)		PCB-43	(0.504)		PCB-66	27.8	
PCB-4	0.895	J	PCB-23	(0.9)		PCB-69/49	18.5	C	PCB-55	(0.537)	
PCB-10	(0.42)		PCB-26/29	1.94	J C	PCB-48	[2.71]	EMPC	PCB-56	10.2	
PCB-9	(0.449)		PCB-25	(0.759)		PCB-44/47/65	27.8	C	PCB-60	[4.73]	EMPC
PCB-7	(0.5)		PCB-31	12.1		PCB-59/62/75	2.33	J C	PCB-80	(0.559)	
PCB-6	0.406	J	PCB-28/20	17.7	C	PCB-42	9.29		PCB-79	0.813	J
PCB-5	(0.515)		PCB-21/33	5.51	C	PCB-41	[0.835]	J EMPC	PCB-78	(0.597)	
PCB-8	2.16		PCB-22	3.99		PCB-71/40	12.3	C	PCB-81	(0.636)	
PCB-14	(0.504)		PCB-36	(0.765)		PCB-64	12.2		PCB-77	[3.24]	EMPC
PCB-11	4.47	B	PCB-39	(0.846)							
PCB-13/12	(0.499)	C	PCB-38	(0.839)							
PCB-15	4.83		PCB-35	(0.872)							
			PCB-37	[6.06]	EMPC						
Conc.	12.8		**Conc.**	59.7					**Conc.**	194	
EMPC	12.8		**EMPC**	65.8					**EMPC**	212	

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Totals	**Conc.**	**EMPC**
Mono-Tri	72.5	78.5
Tetra-Hexa	1,370	1,400
Hepta-Deca	353	363
Mono-Deca	1,790	1,840

Sample ID: GP-801-SS Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.189)		PCB-109/119/86/97/125/87	36.2	C	PCB-155	(0.222)		PCB-165	(0.245)	
PCB-96	1.02		PCB-117	2.95		PCB-152	(0.209)		PCB-146	28.3	
PCB-103	[2.29]	EMPC	PCB-116/85	9.29	C	PCB-150	1.42		PCB-161	(0.209)	
PCB-94	(0.587)		PCB-110	103		PCB-136	26.3		PCB-153/168	128	C
PCB-95	79.8		PCB-115	(0.349)		PCB-145	(0.22)		PCB-141	24.8	
PCB-100/93	2.62	C	PCB-82	[7.47]	EMPC	PCB-148	0.766	J	PCB-130	9.53	
PCB-102	2.71		PCB-111	(0.37)		PCB-151/135	51.5	C	PCB-137	5.27	
PCB-98	(0.523)		PCB-120	1.33		PCB-154	7.52		PCB-164	8.46	
PCB-88	(0.551)		PCB-108/124	2.1	C	PCB-144	6.18		PCB-163/138/129	136	C
PCB-91	21.4		PCB-107	4.02		PCB-147/149	133	C	PCB-160	(0.238)	
PCB-84	26.6		PCB-123	1.17		PCB-134	8.34		PCB-158	12.4	
PCB-89	[0.988]	J EMPC	PCB-106	(0.34)		PCB-143	(0.306)		PCB-128/166	16.4	C
PCB-121	(0.334)		PCB-118	44		PCB-139/140	2.72	C	PCB-159	[0.897]	J EMPC
PCB-92	20.2		PCB-122	[0.771]	J EMPC	PCB-131	[1.51]	EMPC	PCB-162	(0.322)	
PCB-113/90/101	82.9	C	PCB-114	[0.694]	J EMPC	PCB-142	(0.332)		PCB-167	4.19	
PCB-83	5.05		PCB-105	14.3		PCB-132	44.1		PCB-156/157	9.66	C
PCB-99	42.8		PCB-127	(0.336)		PCB-133	3.54		PCB-169	(0.444)	
PCB-112	(0.325)		PCB-126	(0.319)							
			Conc.	504					**Conc.**	669	
			EMPC	516					**EMPC**	671	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.205)		PCB-174	35		PCB-202	3.43		PCB-208	1.91	
PCB-179	14.6		PCB-177	21		PCB-201	2.89		PCB-207	(0.977)	
PCB-184	(0.21)		PCB-181	(0.502)		PCB-204	(0.355)		PCB-206	6.23	
PCB-176	5.2		PCB-171/173	11.2	C	PCB-197	(0.388)				
PCB-186	(0.185)		PCB-172	5.42		PCB-200	[1.96]	EMPC	**Conc.**	8.14	
PCB-178	[6.97]	EMPC	PCB-192	(0.39)		PCB-198/199	17.6	C	**EMPC**	8.14	
PCB-175	1.39		PCB-180/193	74	C	PCB-196	9.53				
PCB-187	42.4		PCB-191	[1.26]	EMPC	PCB-203	9.97		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.472)		PCB-170	34.1		PCB-195	6.58		PCB-209	4.76	
PCB-183	19.8		PCB-190	6.78		PCB-194	14.2				
PCB-185	3.37		PCB-189	1.49		PCB-205	(1.13)				
			Conc.	276		**Conc.**	64.2				
			EMPC	284		**EMPC**	66.2				

Sample ID: GP-802-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.09 g	Sample ID:	B3245_16683_PCB_010-R1	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	90.5 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	10.6				ES PCB-1	32.9
PCB-81 344'5-TeCB	ND	0.792			ES PCB-3	47.5
PCB-105 233'44'-PeCB	20.1				ES PCB-4	49.8
PCB-114 2344'5-PeCB	EMPC		1.2		ES PCB-15	73.4
PCB-118 23'44'5-PeCB	63.3				ES PCB-19	62.1
PCB-123 23'44'5'-PeCB	1.16				ES PCB-37	78.6
PCB-126 33'44'5-PeCB	ND	0.331			ES PCB-54	51
PCB-156/157 233'44'5/233'44'5'-HxCB	9.04			C	ES PCB-77	83.4
PCB-167 23'44'55'-HxCB	3.12				ES PCB-81	83.6
PCB-169 33'44'55'-HxCB	ND	0.701			ES PCB-104	75.6
PCB-189 233'44'55'-HpCB	ND	0.518			ES PCB-105	100
					ES PCB-114	97.6
TEQs (WHO 2005 M/H)					ES PCB-118	100
					ES PCB-123	102
ND = 0	0.00396		0.004		ES PCB-126	95.4
ND = 0.5 x DL	0.0312		0.0312		ES PCB-153	97
ND = DL	0.0584		0.0584		ES PCB-155	95.9
					ES PCB-156/157	109
Totals					ES PCB-167	105
Mono-CB	3.67		7.11		ES PCB-169	110
Di-CB	379				ES PCB-170	101
Tri-CB	1,800		1,800		ES PCB-180	95.8
Tetra-CB	881		887		ES PCB-188	92.9
Penta-CB	534		539		ES PCB-189	98.3
Hexa-CB	393		404		ES PCB-202	98.4
Hepta-CB	139		143		ES PCB-205	112
Octa-CB	43.5		55		ES PCB-206	129
Nona-CB	12.9		17.7		ES PCB-208	106
Deca-CB	12.2				ES PCB-209	134
					CS PCB-28	95.8
Total PCB (Mono-Deca)	4,200		4,250		CS PCB-111	105
					CS PCB-178	105

Checkcode: 735-146-TYR/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:16 Analyst: ah

Sample ID: GP-802-SS

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	30-Apr-2019
Project ID:	Nord Door	Weight/Volume:	10.09 g	Sample ID:	B3245_16683_PCB_010-R1	Date Extracted:	15-May-2019
Date Collected:	26-Apr-2019	% Solid	90.5 %	QC Batch No.:	16683	Date Analyzed:	20-May-2019
		Units	pg/g	Checkcode:	735-146-TYR/C	Time Analyzed:	01:04:07

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	3.67		PCB-19	36.7		PCB-54	(0.644)		PCB-72	[1.56]	EMPC
PCB-2	(0.631)		PCB-30/18	311	C	PCB-50/53	19.1	C	PCB-68	(0.755)	
PCB-3	[3.44]	EMPC	PCB-17	195		PCB-45	27.2		PCB-57	(0.745)	
			PCB-27	27		PCB-51	[5]	EMPC	PCB-58	(0.669)	
Conc.	3.67		PCB-24	6.41		PCB-46	11		PCB-67	4.45	
EMPC	7.11		PCB-16	179		PCB-52	107		PCB-63	4.89	
			PCB-32	110		PCB-73	(0.473)		PCB-61/70/74/76	148	C
Di	**Conc.**	**Qualifiers**	PCB-34	[2.61]	EMPC	PCB-43	4.59		PCB-66	91.5	
PCB-4	82.5		PCB-23	(1.28)		PCB-69/49	76	C	PCB-55	(0.692)	
PCB-10	2.27		PCB-26/29	72.8	C	PCB-48	27.8		PCB-56	45.1	
PCB-9	5.08		PCB-25	36.5		PCB-44/47/65	115	C	PCB-60	11.3	
PCB-7	3.52		PCB-31	220		PCB-59/62/75	15	C	PCB-80	(0.71)	
PCB-6	72.3		PCB-28/20	301	C	PCB-42	40.5		PCB-79	(0.643)	
PCB-5	1.38		PCB-21/33	135	C	PCB-41	8.55		PCB-78	(0.755)	
PCB-8	133		PCB-22	97.4		PCB-71/40	58	C	PCB-81	(0.792)	
PCB-14	(0.403)		PCB-36	(1.1)		PCB-64	55.4		PCB-77	10.6	
PCB-11	7.43	B	PCB-39	(1.21)							
PCB-13/12	9.65	C	PCB-38	(1.21)							
PCB-15	61		PCB-35	(1.25)							
			PCB-37	76.4							
Conc.	379		**Conc.**	1,800					**Conc.**	881	
EMPC	379		**EMPC**	1,800					**EMPC**	887	

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Totals	**Conc.**	**EMPC**
Mono-Tri	2,180	2,190
Tetra-Hexa	1,810	1,830
Hepta-Deca	207	228
Mono-Deca	4,200	4,250

Sample ID: GP-802-SS **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.307)		PCB-109/119/86/97/125/87	52.3	C	PCB-155	(0.239)		PCB-165	(0.284)	
PCB-96	0.923	J	PCB-117	1.55		PCB-152	(0.223)		PCB-146	14.1	
PCB-103	1.63		PCB-116/85	13.6	C	PCB-150	(0.256)		PCB-161	(0.251)	
PCB-94	(0.503)		PCB-110	94.9		PCB-136	12.8		PCB-153/168	70.5	C
PCB-95	71		PCB-115	(0.255)		PCB-145	(0.233)		PCB-141	13	
PCB-100/93	(0.452)	C	PCB-82	9		PCB-148	(0.344)		PCB-130	8.99	
PCB-102	2.34		PCB-111	(0.309)		PCB-151/135	28.4	C	PCB-137	4.66	
PCB-98	(0.474)		PCB-120	(0.255)		PCB-154	2.42		PCB-164	[5.44]	EMPC
PCB-88	(0.472)		PCB-108/124	2.06	C	PCB-144	2.9		PCB-163/138/129	91.5	C
PCB-91	13.9		PCB-107	5.77		PCB-147/149	68.4	C	PCB-160	(0.293)	
PCB-84	29.2		PCB-123	1.16		PCB-134	[5.41]	EMPC	PCB-158	8.94	
PCB-89	(0.434)		PCB-106	(0.296)		PCB-143	(0.375)		PCB-128/166	14.8	C
PCB-121	(0.29)		PCB-118	63.3		PCB-139/140	1.9	J C	PCB-159	(0.479)	
PCB-92	20		PCB-122	0.947	J	PCB-131	1.29		PCB-162	(0.562)	
PCB-113/90/101	90.2	C	PCB-114	[1.2]	EMPC	PCB-142	(0.387)		PCB-167	3.12	
PCB-83	[4.7]	EMPC	PCB-105	20.1		PCB-132	34.4		PCB-156/157	9.04	C
PCB-99	39.7		PCB-127	(0.335)		PCB-133	1.75		PCB-169	(0.701)	
PCB-112	(0.266)		PCB-126	(0.331)							
			Conc.	534					**Conc.**	393	
			EMPC	539					**EMPC**	404	
Hepta	**Conc.**	**Qualifiers**	**Hepta**	**Conc.**	**Qualifiers**	**Octa**	**Conc.**	**Qualifiers**	**Nona**	**Conc.**	**Qualifiers**
PCB-188	(0.192)		PCB-174	17.4		PCB-202	5.32		PCB-208	[4.81]	EMPC
PCB-179	7.92		PCB-177	10.8		PCB-201	2.91		PCB-207	(1.28)	
PCB-184	(0.198)		PCB-181	(0.465)		PCB-204	(0.296)		PCB-206	12.9	
PCB-176	3.14		PCB-171/173	5.74	C	PCB-197	(0.316)				
PCB-186	(0.175)		PCB-172	2.72		PCB-200	[1.85]	EMPC	**Conc.**	12.9	
PCB-178	[3.88]	EMPC	PCB-192	(0.367)		PCB-198/199	16.8	C	**EMPC**	17.7	
PCB-175	(0.522)		PCB-180/193	35.4	C	PCB-196	6.22				
PCB-187	25.4		PCB-191	(0.423)		PCB-203	8.81		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.445)		PCB-170	15.1		PCB-195	3.5		PCB-209	12.2	
PCB-183	10.6		PCB-190	2.83		PCB-194	[9.63]	EMPC			
PCB-185	1.65		PCB-189	(0.518)		PCB-205	(1.01)				
			Conc.	139		**Conc.**	43.5				
			EMPC	143		**EMPC**	55				

Sample ID: Method Blank B3245_16683 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245
Project ID:	Nord Door	Weight/Volume:	10.00 g	Sample ID:	MB1_16683_PCB_SDS
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	16683

Date Received:	n/a
Date Extracted:	15-May-2019
Date Analyzed:	19-May-2019

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.853			ES PCB-1	69.1
PCB-81 344'5-TeCB	ND	0.866			ES PCB-3	72.6
PCB-105 233'44'-PeCB	ND	0.361			ES PCB-4	82.3
PCB-114 2344'5-PeCB	ND	0.335			ES PCB-15	76.1
PCB-118 23'44'5-PeCB	ND	0.339			ES PCB-19	86.5
PCB-123 23'44'5'-PeCB	ND	0.338			ES PCB-37	73.7
PCB-126 33'44'5-PeCB	ND	0.457			ES PCB-54	79.4
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	0.628		C	ES PCB-77	77.7
PCB-167 23'44'55'-HxCB	ND	0.413			ES PCB-81	75.9
PCB-169 33'44'55'-HxCB	ND	0.532			ES PCB-104	90.5
PCB-189 233'44'55'-HpCB	ND	0.611			ES PCB-105	93
					ES PCB-114	88.4
TEQs (WHO 2005 M/H)					ES PCB-118	92.2
					ES PCB-123	89.8
ND = 0	0		0		ES PCB-126	87.2
ND = 0.5 x DL	0.031		0.031		ES PCB-153	96.1
ND = DL	0.062		0.062		ES PCB-155	96.7
					ES PCB-156/157	108
Totals					ES PCB-167	102
Mono-CB	ND	0.888			ES PCB-169	105
Di-CB	2.68				ES PCB-170	92.8
Tri-CB	ND	1.33			ES PCB-180	86.9
Tetra-CB	ND	0.888			ES PCB-188	98.5
Penta-CB	ND	0.365			ES PCB-189	98.2
Hexa-CB	ND	0.47			ES PCB-202	101
Hepta-CB	ND	0.572			ES PCB-205	110
Octa-CB	ND	0.486			ES PCB-206	120
Nona-CB	ND	2.36			ES PCB-208	104
Deca-CB	ND	0.94			ES PCB-209	132
					CS PCB-28	85.4
Total PCB (Mono-Deca)	2.68		2.68		CS PCB-111	89.3
					CS PCB-178	99.4

Checkcode: 143-962-JLX/C SGS North America - PCB v0.83 Report Created: 21-May-2019 09:14 Analyst: ah

Sample ID: Method Blank B3245_16683 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B3245	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	10.00 g	Sample ID:	MB1_16683_PCB_SDS	Date Extracted:	15-May-2019
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	16683	Date Analyzed:	19-May-2019
		Units	pg/g	Checkcode:	143-962-JLX/C	Time Analyzed:	16:27:04

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(0.887)		PCB-19	(1.5)		PCB-54	(0.629)		PCB-72	(0.776)	
PCB-2	(0.834)		PCB-30/18	(1.11)	C	PCB-50/53	(1.1)	C	PCB-68	(0.825)	
PCB-3	(0.89)		PCB-17	(1.61)		PCB-45	(1.29)		PCB-57	(0.814)	
			PCB-27	(1.14)		PCB-51	(1.11)		PCB-58	(0.73)	
Conc.	0		PCB-24	(1.12)		PCB-46	(1.39)		PCB-67	(0.738)	
EMPC	0		PCB-16	(1.68)		PCB-52	(0.995)		PCB-63	(0.892)	
			PCB-32	(1.04)		PCB-73	(0.848)		PCB-61/70/74/76	(0.79)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(1.19)		PCB-43	(1.1)		PCB-66	(0.764)	
PCB-4	(0.629)		PCB-23	(1.18)		PCB-69/49	(0.986)	C	PCB-55	(0.756)	
PCB-10	(0.466)		PCB-26/29	(1.16)	C	PCB-48	(1.18)		PCB-56	(0.8)	
PCB-9	(0.4)		PCB-25	(0.993)		PCB-44/47/65	(1.02)	C	PCB-60	(0.928)	
PCB-7	(0.45)		PCB-31	(1.02)		PCB-59/62/75	(0.897)	C	PCB-80	(0.776)	
PCB-6	(0.382)		PCB-28/20	(1.09)	C	PCB-42	(1.31)		PCB-79	(0.702)	
PCB-5	(0.466)		PCB-21/33	(1.13)	C	PCB-41	(1.51)		PCB-78	(0.825)	
PCB-8	(0.367)		PCB-22	(1.03)		PCB-71/40	(1.05)	C	PCB-81	(0.866)	
PCB-14	(0.443)		PCB-36	(1.02)		PCB-64	(0.891)		PCB-77	(0.853)	
PCB-11	2.68		PCB-39	(1.12)							
PCB-13/12	(0.448)	C	PCB-38	(1.11)							
PCB-15	(0.419)		PCB-35	(1.15)							
			PCB-37	(1.16)							
Conc.	2.68		**Conc.**	0					**Conc.**	0	
EMPC	2.68		**EMPC**	0					**EMPC**	0	

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Totals	Conc.	EMPC
Mono-Tri	2.68	2.68
Tetra-Hexa	0	0
Hepta-Deca	0	0
Mono-Deca	2.68	2.68

Sample ID: Method Blank B3245_16683 **Method 1668C**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.364)		PCB-109/119/86/97/125/87	(0.374)	C	PCB-155	(0.309)		PCB-165	(0.407)	
PCB-96	(0.371)		PCB-117	(0.348)		PCB-152	(0.288)		PCB-146	(0.41)	
PCB-103	(0.45)		PCB-116/85	(0.397)	C	PCB-150	(0.331)		PCB-161	(0.359)	
PCB-94	(0.545)		PCB-110	(0.316)		PCB-136	(0.343)		PCB-153/168	(0.382)	C
PCB-95	(0.48)		PCB-115	(0.277)		PCB-145	(0.301)		PCB-141	(0.52)	
PCB-100/93	(0.49)	C	PCB-82	(0.475)		PCB-148	(0.492)		PCB-130	(0.607)	
PCB-102	(0.351)		PCB-111	(0.335)		PCB-151/135	(0.485)	C	PCB-137	(0.522)	
PCB-98	(0.514)		PCB-120	(0.277)		PCB-154	(0.462)		PCB-164	(0.352)	
PCB-88	(0.511)		PCB-108/124	(0.333)	C	PCB-144	(0.5)		PCB-163/138/129	(0.459)	C
PCB-91	(0.477)		PCB-107	(0.313)		PCB-147/149	(0.447)	C	PCB-160	(0.419)	
PCB-84	(0.559)		PCB-123	(0.338)		PCB-134	(0.573)		PCB-158	(0.37)	
PCB-89	(0.471)		PCB-106	(0.321)		PCB-143	(0.537)		PCB-128/166	(0.488)	C
PCB-121	(0.315)		PCB-118	(0.339)		PCB-139/140	(0.466)	C	PCB-159	(0.374)	
PCB-92	(0.506)		PCB-122	(0.41)		PCB-131	(0.562)		PCB-162	(0.438)	
PCB-113/90/101	(0.421)	C	PCB-114	(0.335)		PCB-142	(0.553)		PCB-167	(0.413)	
PCB-83	(0.582)		PCB-105	(0.361)		PCB-132	(0.529)		PCB-156/157	(0.628)	C
PCB-99	(0.359)		PCB-127	(0.334)		PCB-133	(0.485)		PCB-169	(0.532)	
PCB-112	(0.289)		PCB-126	(0.457)							
			Conc.	0					**Conc.**	0	
			EMPC	0					**EMPC**	0	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.296)		PCB-174	(0.641)		PCB-202	(0.261)		PCB-208	(1.43)	
PCB-179	(0.28)		PCB-177	(0.645)		PCB-201	(0.297)		PCB-207	(1.51)	
PCB-184	(0.307)		PCB-181	(0.604)		PCB-204	(0.256)		PCB-206	(3.29)	
PCB-176	(0.326)		PCB-171/173	(0.709)	C	PCB-197	(0.273)				
PCB-186	(0.27)		PCB-172	(0.703)		PCB-200	(0.285)		**Conc.**	0	
PCB-178	(0.432)		PCB-192	(0.477)		PCB-198/199	(0.347)	C	**EMPC**	0	
PCB-175	(0.678)		PCB-180/193	(0.579)	C	PCB-196	(0.389)				
PCB-187	(0.562)		PCB-191	(0.55)		PCB-203	(0.312)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.578)		PCB-170	(0.889)		PCB-195	(0.875)		PCB-209	(0.94)	
PCB-183	(0.593)		PCB-190	(0.634)		PCB-194	(0.847)				
PCB-185	(0.75)		PCB-189	(0.611)		PCB-205	(0.711)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM4_PCB_08292018_04Jan2019		
Instrument ID:	MM4	GC Column ID:	
VER Data Filename:	190519S02	Analysis Date:	19-MAY-2019 15:29:33
Lab ID:	OPR1_16683_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	111	60	-	135	Y
PCB-3 4-MoCB	50	109	60	-	135	Y
PCB-4 22'-DiCB	50	113	60	-	135	Y
PCB-15 44'-DiCB	50	98.2	60	-	135	Y
PCB-19 22'6-TrCB	50	105	60	-	135	Y
PCB-37 344'-TrCB	50	97.9	60	-	135	Y
PCB-54 22'66'-TeCB	50	97.8	60	-	135	Y
PCB-77 33'44'-TeCB	50	97.2	60	-	135	Y
PCB-81 344'5-TeCB	50	86.3	60	-	135	Y
PCB-104 22'466'-PeCB	50	88.8	60	-	135	Y
PCB-105 233'44'-PeCB	50	97.4	60	-	135	Y
PCB-114 2344'5-PeCB	50	91.7	60	-	135	Y
PCB-118 23'44'5-PeCB	50	91.5	60	-	135	Y
PCB-123 23'44'5'-PeCB	50	88.5	60	-	135	Y
PCB-126 33'44'5-PeCB	50	110	60	-	135	Y
PCB-155 22'44'66'-HxCB	50	87.5	60	-	135	Y
PCB-156/157 ...-HxCB	100	92.7	60	-	135	Y
PCB-167 23'44'55'-HxCB	50	94.9	60	-	135	Y
PCB-169 33'44'55'-HxCB	50	103	60	-	135	Y
PCB-188 22'34'566'-HpCB	50	97.4	60	-	135	Y
PCB-189 233'44'55'-HpCB	50	96.3	60	-	135	Y
PCB-202 22'33'55'66'-OcCB	50	93.5	60	-	135	Y
PCB-205 233'44'55'6-OcCB	50	96.9	60	-	135	Y
PCB-206 22'33'44'55'6-NoCB	50	106	60	-	135	Y
PCB-208 22'33'455'66'-NoCB	50	100	60	-	135	Y
PCB-209 DeCB	50	88.6	60	-	135	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668C.

Processed: 21 May 2019 09:13 Analyst: ah

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_08292018_04Jan2019
Instrument ID: MM4 GC Column ID:
VER Data Filename: 190519S02 Analysis Date: 19-MAY-2019 15:29:33
Lab ID: OPR1_16683_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)	OK
ES PCB-1	100	72.4	15 - 145	Y
ES PCB-3	100	74.3	15 - 145	Y
ES PCB-4	100	80.8	15 - 145	Y
ES PCB-15	100	78.6	15 - 145	Y
ES PCB-19	100	85.1	15 - 145	Y
ES PCB-37	100	73.1	15 - 145	Y
ES PCB-54	100	73.2	15 - 145	Y
ES PCB-77	100	78.1	40 - 145	Y
ES PCB-81	100	77.8	40 - 145	Y
ES PCB-104	100	84.3	40 - 145	Y
ES PCB-105	100	94.9	40 - 145	Y
ES PCB-114	100	91.4	40 - 145	Y
ES PCB-118	100	91.3	40 - 145	Y
ES PCB-123	100	92.8	40 - 145	Y
ES PCB-126	100	95.2	40 - 145	Y
ES PCB-153	100	89.7	40 - 145	Y
ES PCB-155	100	87.1	40 - 145	Y
ES PCB-156/157	200	108	40 - 145	Y
ES PCB-167	100	101	40 - 145	Y
ES PCB-169	100	115	40 - 145	Y
ES PCB-170	100	89	40 - 145	Y
ES PCB-180	100	84.2	40 - 145	Y
ES PCB-188	100	88.1	40 - 145	Y
ES PCB-189	100	98.1	40 - 145	Y
ES PCB-202	100	97.2	40 - 145	Y
ES PCB-205	100	108	40 - 145	Y
ES PCB-206	100	124	40 - 145	Y
ES PCB-208	100	98	40 - 145	Y
ES PCB-209	100	135	40 - 145	Y
CLEANUP STANDARDS				
CS PCB-28	100	90.4	15 - 145	Y
CS PCB-111	100	93.9	40 - 145	Y
CS PCB-178	100	98.5	40 - 145	Y

Processed: 21 May 2019 09:13 Analyst: ah

SGS

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager: *Amy Boehm*
Receipt Date & Time: *30-Apr-19 at 11:48*
AP Project name: *B3245*
Requested TAT: *21 days*
Projected due date: *21-May-19*
Matrix: *Soil*
Phone#: *910-794-1613*
Email Address: *Amy.Boehm@sgs.com*

Company Contact: *Chris Kramer*
Company: *SLR International Corp*
Project Name & Site: *Nord Door*
Project PO#: *108.00228.00059*
QAAP/Contract #: *n/a*
Requested Analysis: *M1613B & M1668C*
Phone#: *503-723-4423*
Email Address: *ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
GP-MW-11-SS	B3245_001	Soil - D/F & PCB	1	4oz Amber	25-Apr-19	15:10	0.9	1	7869 4161 1768
GP-MW-12-SS	B3245_002	Soil - D/F & PCB	1	4oz Amber	25-Apr-19	11:40	0.9	1	7869 4161 1768
GP-MW-12-SS-18-19	B3245_003	Soil - D/F	1	4oz Amber	25-Apr-19	11:18	0.9	1	7869 4161 1768
GP-MW-13-SS	B3245_004	Soil - D/F & PCB	2	4oz Amber	25-Apr-19	09:40	0.9	1	7869 4161 1768
GP-MW-14-SS	B3245_005	Soil - D/F & PCB	1	4oz Amber	25-Apr-19	14:15	0.9	1	7869 4161 1768
GP-MW-15-SS	B3245_006	Soil - PCB	1	4oz Amber	26-Apr-19	13:42	0.9	1	7869 4161 1768
GP-MW-16-SS	B3245_007	Soil - D/F & PCB	1	4oz Amber	26-Apr-19	13:15	0.9	1	7869 4161 1768
GP-MW-17-SS	B3245_008	Soil - D/F & PCB	1	4oz Amber	26-Apr-19	14:50	0.9	1	7869 4161 1768
GP-801-SS	B3245_009	Soil - D/F & PCB	1	4oz Amber	26-Apr-19	08:45	0.9	1	7869 4161 1768
GP-802-SS	B3245_010	Soil - D/F & PCB	1	4oz Amber	26-Apr-19	16:15	0.9	1	7869 4161 1768

Preservation Type:
Sample Seals: No

Notes/Comments:

Samples received intact

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens
Logged in by: Ashley Owens
QC'ed by: AK 30 Apr 19

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

SGS

CHAIN OF CUSTODY

B3245

PROJECT INFO
PROJECT: Nord Door
P.O. #: 108.00228.00059
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard TAT
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

SEND DOCUMENTATION / RESULTS TO
COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd, ste 440
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO (☑ CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

	PRESERVATIVE																
	ANALYSIS & METHOD																
	SAMPLE ID / DESCRIPTION	**DATE**	**TIME**	**QTY**	**MATRIX**	Dioxins / Furans	PCBs								**MS MSD**	**MS/ DUP**	**REMARKS**
001	GP-MW-11-SS	4/25/19	1510	1	soil	X	X										
002	GP-MW-12-SS	4/25/19	1140	1	Soil	X	X										
**003	GP-MW-12-SS-18-19	4/25/19	1118	1	soil	X											~~Hold~~ **analyze for D/Fs per email AK 5/1/19
004	GP-MW-13-SS	4/25/19	0940	2	Soil	X	X										
005	GP-MW-14-SS	4/25/19	1415	1	Soil	X	X										
006	GP-MW-15-SS	4/26/19	1342	1	Soil		X										
007	GP-MW-16-SS	4/26/19	1315	1	Soil	X	X										
008	GP-MW-17-SS	4/26/19	1450	1	Soil	X	X										
009	GP-801-SS	4/26/19	0845	1	Soil	X	X										
010	GP-802-SS	4/26/19	1635	1	Soil	X	X										

COLLECTED/RELINQUISHED BY (1): DATE: 4/29/19 TIME: 1400 RECEIVED BY:
RELINQUISHED BY (2): DATE: TIME: RECEIVED BY:
RELINQUISHED BY (3): DATE: TIME: RECEIVED BY:

RECEIVED BY LABORATORY: Ashley Owens DATE: 4/30/19 TIME: 11:48
COOLER SEAL: ☑ INTACT ☐ BROKEN ☐ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☑ ABSENT
CARRIER: FedEx TEMP: °C 0.9°
TRACKING #:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

21 May 2019

Chris Kramer
SLR International Corporation
22118 20th Avenue SE G202
Bothell, WA 98021

RE: Former E.A, Nord

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
19E0097	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Shelly L Fisher

Cert# 100006

PJLA Testing
Accreditation # 66169

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

ARI Assigned Number: 19E0097	Turn-around Requested: Standard TAT	Page: 1	of 1
ARI Client Company: SLR	Phone: (425) 402-8800	Date: 5/6/19	Ice Present?
Client Contact: Chris Kramer ckramer@slrconsulting.com		No. of Coolers: 1	Cooler Temps: 2.8
Client Project Name: Nord Door			
Client Project #: 108.00228.00059	Samplers: Steven Losleben		

Sample ID	Date	Time	Matrix	No. Containers	cPAHs by 8270-SIM LL								Notes/Comments
MW-11A-0519	5/3/19	1537	water	2	X								
MW-11B-0519	↓	1617	↓	↓	X								
MW-12-0519		1120			X								
MW-13-0519		1025			X								
MW-14-0519		1207			X								
MW-16-0519		1357			X								
MW-17-0519		1444			X								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature)	(Signature)	(Signature)	(Signature)
	Printed Name: Steven Losleben	Printed Name: Erin Salle	Printed Name:	Printed Name:
	Company: SLR	Company: ARI	Company:	Company:
	Date & Time: 5/7/19 @ 1000	Date & Time: 5/7/19 1056	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Report

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-11A-0519	19E0097-01	Water	03-May-2019 15:37	07-May-2019 10:56
MW-11B-0519	19E0097-02	Water	03-May-2019 16:17	07-May-2019 10:56
MW-12-0519	19E0097-03	Water	03-May-2019 11:20	07-May-2019 10:56
MW-13-0519	19E0097-04	Water	03-May-2019 10:25	07-May-2019 10:56
MW-14-0519	19E0097-05	Water	03-May-2019 12:07	07-May-2019 10:56
MW-16-0519	19E0097-06	Water	03-May-2019 13:57	07-May-2019 10:56
MW-17-0519	19E0097-07	Water	03-May-2019 14:44	07-May-2019 10:56

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received May 7, 2019 under ARI work order 19E0097. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Polynuclear Aromatic Hydrocarbons (PAH) - EPA Method SW8270D-SIM

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Printed: 5/8/2019 8:12:48AM

WORK ORDER

19E0097

Client: **SLR International Corporation**
Project Manager: **Shelly Fishel**
Project: **Former E.A, Nord**
Project Number: **[none]**

Report To:
SLR International Corporation
Chris Kramer
22118 20th Avenue SE G202
Bothell, WA 98021
Phone: (503) 905-3205
Fax: -

Invoice To:
SLR International Corporation
Chris Kramer
22118 20th Avenue SE G202
Bothell, WA 98021
Phone :(503) 905-3205
Fax: -

Date Due: 21-May-2019 18:00 (10 day TAT)

Received By: Erin I. Salle
Date Received: 07-May-2019 10:56

Logged In By: Erin I. Salle
Date Logged In: 08-May-2019 08:07

Samples Received at:**2.8°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No
Custody papers properly filled out (in, signed, analyses requested, etc)	Yes
Was sufficient ice used (if appropriate)	Yes
All bottles arrived in good condition (unbroken)	Yes
Number of containers listed on COC match number received	Yes
Correct bottles used for the requested analyses	Yes
Analyses/bottles require preservation (attach preservation sheet excluding VOC)	No
Sample split at ARI	No
Custody papers included with the cooler	Yes
Was a temperature blank included in the cooler	No
All bottles sealed in individual plastic bags	No
All bottle labels complete and legible	Yes
Bottle labels and tags agree with COC	Yes
All VOC vials free of air bubbles	No
Sufficient amount of sample sent in each bottle	Yes

Analysis	**Due**	**TAT**	**Expires**	**Comments**

WORK ORDER

19E0097

Client: SLR International Corporation
Project: Former E.A, Nord
Project Manager: Shelly Fishel
Project Number: [none]

Analysis	Due	TAT	Expires	Comments
19E0097-01 MW-11A-0519 [Water] Sampled 03-May-2019 15:37 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 15:37	
19E0097-02 MW-11B-0519 [Water] Sampled 03-May-2019 16:17 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 16:17	
19E0097-03 MW-12-0519 [Water] Sampled 03-May-2019 11:20 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 11:20	
19E0097-04 MW-13-0519 [Water] Sampled 03-May-2019 10:25 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 10:25	
19E0097-05 MW-14-0519 [Water] Sampled 03-May-2019 12:07 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 12:07	
19E0097-06 MW-16-0519 [Water] Sampled 03-May-2019 13:57 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 13:57	
19E0097-07 MW-17-0519 [Water] Sampled 03-May-2019 14:44 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL *B = Glass NM, Amber, 500 mL*				
8270D-SIM PAH Low (0.01 ug/L - 0.5	21-May-2019 15:00	10	10-May-2019 14:44	

Reviewed By ____________________ Date ____________

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: SLR

Project Name: Nord Door

COC No(s): ____________ NA

Delivered by: Fed-Ex UPS [✓ Courier] Hand Delivered Other: ______

Assigned ARI Job No: 19E0097

Tracking No: ____________ [✓ NA]

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? YES [✓ NO]

Were custody papers included with the cooler? [✓ YES] NO

Were custody papers properly filled out (ink, signed, etc.) [✓ YES] NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1253 2.8 ___ ___ ___ ___ ___

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: DOO5206

Cooler Accepted by: ____________ Date: 5/7/19 Time: 1056

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES [✓ NO]

What kind of packing material was used? ... Bubble Wrap [✓ Wet Ice] Gel Packs Baggies Foam Block Paper Other: Garbage bag

Was sufficient ice used (if appropriate)? NA [✓ YES] NO

How were bottles sealed in plastic bags? Individually [✓ Grouped] [✓ Not] Bag

Did all bottles arrive in good condition (unbroken)? [✓ YES] NO

Were all bottle labels complete and legible? [✓ YES] NO

Did the number of containers listed on COC match with the number of containers received? [✓ YES] NO

Did all bottle labels and tags agree with custody papers? [✓ YES] NO

Were all bottles used correct for the requested analyses? [✓ YES] NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ... NA YES [✓ NO]

Were all VOC vials free of air bubbles? [✓ NA] YES NO

Was sufficient amount of sample sent in each bottle? [✓ YES] NO

Date VOC Trip Blank was made at ARI [✓ NA] ____________

Were the sample(s) split by ARI? [✓ NA] YES Date/Time: ____________ Equipment: ____________ Split by: ________

Samples Logged by: ____________ Date: 5/18/19 Time: 0807 Labels checked by: JB

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-11A-0519

19E0097-01 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM
Instrument: NT11 Analyst: VTS

Sampled: 05/03/2019 15:37
Analyzed: 05/14/2019 17:19

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BHE0199
Prepared: 08-May-2019

Sample Size: 500 mL
Final Volume: 0.5 mL

Extract ID: 19E0097-01 A 01

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	**0.001**	ug/L	J
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*68.7*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*76.4*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*81.0*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-11B-0519
19E0097-02 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 16:17
Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 17:49

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-02 A 01
Preparation Batch: BHE0199 — Sample Size: 500 mL
Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	ND	ug/L	U
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*77.0*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*84.7*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*87.8*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-12-0519

19E0097-03 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 11:20

Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 18:18

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-03 A 01

Preparation Batch: BHE0199 — Sample Size: 500 mL

Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	**0.002**	ug/L	J
Chrysene	218-01-9	1	0.0009	0.010	**0.004**	ug/L	J
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	**0.002**	ug/L	J
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*79.9*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*79.0*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*102*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-13-0519

19E0097-04 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 10:25

Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 18:48

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-04 A 01

Preparation Batch: BHE0199 — Sample Size: 500 mL

Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	**0.019**	ug/L	
Chrysene	218-01-9	1	0.0009	0.010	**0.023**	ug/L	
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	**0.018**	ug/L	
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	**0.007**	ug/L	J
Benzo(a)pyrene	50-32-8	1	0.002	0.010	**0.014**	ug/L	
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	**0.010**	ug/L	J
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	**0.003**	ug/L	J
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*79.4*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*85.1*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*94.7*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-13-0519

19E0097-04RE1 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 10:25

Instrument: NT11 Analyst: VTS — Analyzed: 05/16/2019 19:34

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-04RE1 A 01

Preparation Batch: BHE0199 — Sample Size: 500 mL

Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	**0.018**	ug/L	
Chrysene	218-01-9	1	0.0009	0.010	**0.022**	ug/L	
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	**0.016**	ug/L	
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	**0.007**	ug/L	J
Benzo(a)pyrene	50-32-8	1	0.002	0.010	**0.014**	ug/L	
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	**0.011**	ug/L	
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	**0.004**	ug/L	J
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*77.1*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*91.0*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*88.7*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-14-0519
19E0097-05 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 12:07
Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 19:18

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-05 A 01
Preparation Batch: BHE0199 — Sample Size: 500 mL
Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	ND	ug/L	U
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*87.7*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*93.7*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*66.7*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-14-0519

19E0097-05RE1 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 12:07

Instrument: NT11 Analyst: VTS — Analyzed: 05/18/2019 12:57

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-05RE1 A 01

Preparation Batch: BHE0199 — Sample Size: 500 mL

Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	**0.001**	ug/L	J
Chrysene	218-01-9	1	0.0009	0.010	**0.002**	ug/L	J
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*81.2*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*87.6*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*61.5*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-16-0519

19E0097-06 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 13:57

Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 19:47

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-06 A 01

Preparation Batch: BHE0199 — Sample Size: 500 mL

Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	**0.001**	ug/L	J
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*85.5*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*94.9*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*94.1*	*%*	

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

MW-17-0519

19E0097-07 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM — Sampled: 05/03/2019 14:44

Instrument: NT11 Analyst: VTS — Analyzed: 05/14/2019 20:17

Sample Preparation: Preparation Method: EPA 3510C SepF — Extract ID: 19E0097-07 A 01
Preparation Batch: BHE0199 — Sample Size: 500 mL
Prepared: 08-May-2019 — Final Volume: 0.5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	ND	ug/L	U
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*85.6*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*81.5*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*92.7*	*%*	

SLR International Corporation
22118 20th Avenue SE G202
Bothell WA, 98021

Project: Former E.A, Nord
Project Number: 108.00228.00059
Project Manager: Chris Kramer

Reported:
21-May-2019 14:39

Semivolatile Organic Compounds - SIM - Quality Control

Batch BHE0199 - EPA 3510C SepF

Instrument: NT11 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BHE0199-BLK1)					Prepared: 08-May-2019 Analyzed: 14-May-2019 15:21						
Benzo(a)anthracene	ND	0.0008	0.010	ug/L							U
Chrysene	ND	0.0009	0.010	ug/L							U
Benzo(b)fluoranthene	ND	0.0005	0.010	ug/L							U
Benzo(k)fluoranthene	ND	0.003	0.010	ug/L							U
Benzo(a)pyrene	ND	0.002	0.010	ug/L							U
Indeno(1,2,3-cd)pyrene	0.002	0.001	0.010	ug/L							J
Dibenzo(a,h)anthracene	0.003	0.001	0.010	ug/L							J
Surrogate: 2-Methylnaphthalene-d10	0.235			ug/L	*0.300*		*78.4*	*42-120*			
Surrogate: Dibenzo[a,h]anthracene-d14	0.271			ug/L	*0.300*		*90.4*	*29-120*			
Surrogate: Fluoranthene-d10	0.259			ug/L	*0.300*		*86.4*	*57-120*			
LCS (BHE0199-BS1)					Prepared: 08-May-2019 Analyzed: 14-May-2019 15:51						
Benzo(a)anthracene	0.265	0.0008	0.010	ug/L	0.300		88.5	42-120			
Chrysene	0.269	0.0009	0.010	ug/L	0.300		89.6	44-120			
Benzo(b)fluoranthene	0.256	0.0005	0.010	ug/L	0.300		85.5	44-120			
Benzo(k)fluoranthene	0.273	0.003	0.010	ug/L	0.300		91.1	50-120			
Benzo(a)pyrene	0.223	0.002	0.010	ug/L	0.300		74.4	35-120			
Indeno(1,2,3-cd)pyrene	0.269	0.001	0.010	ug/L	0.300		89.6	37-120			
Dibenzo(a,h)anthracene	0.265	0.001	0.010	ug/L	0.300		88.4	34-120			
Surrogate: 2-Methylnaphthalene-d10	0.249			ug/L	*0.300*		*83.2*	*42-120*			
Surrogate: Dibenzo[a,h]anthracene-d14	0.280			ug/L	*0.300*		*93.3*	*29-120*			
Surrogate: Fluoranthene-d10	0.280			ug/L	*0.300*		*93.2*	*57-120*			

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: 108.00228.00059	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	21-May-2019 14:39

Certified Analyses included in this Report

Analyte	Certifications
EPA 8270D-SIM in Water	
Naphthalene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
2-Methylnaphthalene	ADEC,DoD-ELAP,NELAP,CALAP
1-Methylnaphthalene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Biphenyl	NELAP
Acenaphthylene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Acenaphthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Dibenzofuran	ADEC,DoD-ELAP,NELAP,CALAP
Fluorene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Phenanthrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Carbazole	NELAP
Fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(a)anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Chrysene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(b)fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(k)fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(j)fluoranthene	ADEC,DoD-ELAP,NELAP,WADOE
Benzo(e)pyrene	NELAP
Benzo(a)pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Perylene	ADEC,NELAP,CALAP
Indeno(1,2,3-cd)pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Dibenzo(a,h)anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(g,h,i)perylene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
CALAP	California Department of Public Health CAELAP	2748	06/30/2019
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2020
WADOE	WA Dept of Ecology	C558	06/30/2019
WA-DW	Ecology - Drinking Water	C558	06/30/2019

Notes and Definitions

*	Flagged value is not within established control limits.
J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 May 2019

Chris Kramer
SLR International Corporation
22118 20th Avenue SE G202
Bothell, WA 98021

RE: Former E.A, Nord

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
19E0011	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Shelly L Fisher

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entir

Cert# 100006

PJLA Testing
Accreditation # 66169

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

ARI Assigned Number: 19E0011
Turn-around Requested: Standard TAT
Page: 1 of 1
ARI Client Company: SLR
Phone:
Date: 4/29/19
Ice Present?
Client Contact: Chris Kramer ckramer@slrconsulting.com
No. of Coolers: 1
Cooler Temps: 2.6
Client Project Name: Nord Door
Client Project #: 108.00228.00059
Samplers: Steven Losleben

					Analysis Requested								Notes/Comments
Sample ID	Date	Time	Matrix	No. Containers	cPAHs by 8270-SIM LL								
GP-801-GW	4/26/19	0900	water	1	X								
GP-802-GW	4/26/19	1635	water	1	X								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature) Sarah	(Signature)	(Signature)	(Signature)
	Printed Name: Sarah Thompson	Printed Name: Erin Salle	Printed Name:	Printed Name:
	Company: SLR	Company: ARI	Company:	Company:
	Date & Time: 5/1/19 12:38	Date & Time: ~~4/28~~ 5/1/19 1238	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Report

SLR International Corporation
22118 20th Avenue SE G202
Bothell WA, 98021

Project: Former E.A, Nord
Project Number: [none]
Project Manager: Chris Kramer

Reported:
15-May-2019 11:25

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GP-801-GW	19E0011-01	Water	26-Apr-2019 09:00	01-May-2019 12:38
GP-802-GW	19E0011-02	Water	26-Apr-2019 16:35	01-May-2019 12:38

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: [none]	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	15-May-2019 11:25

Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received May 1, 2019 under ARI work order 19E0011. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Polynuclear Aromatic Hydrocarbons (PAH) - EPA Method SW8270D-SIM

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits except in sample 19E 0011-02 Dibenzo(a,h)antracene was out of control high and is flagged.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Printed: 5/2/2019 8:03:07AM

WORK ORDER

19E0011

Client: **SLR International Corporation**

Project: **Former E.A, Nord**

Project Manager: **Shelly Fishel**

Project Number: **[none]**

Report To:

SLR International Corporation
Chris Kramer
22118 20th Avenue SE G202
Bothell, WA 98021
Phone: (503) 905-3205
Fax: -

Invoice To:

SLR International Corporation
Chris Kramer
22118 20th Avenue SE G202
Bothell, WA 98021
Phone :(503) 905-3205
Fax: -

Date Due: 15-May-2019 18:00 (10 day TAT)

Received By: Erin I. Salle

Logged In By: Erin I. Salle

Date Received: 01-May-2019 12:38

Date Logged In: 02-May-2019 07:58

Samples Received at:**2.6°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s).....No
Custody papers properly filled out (in, signed, analyses requested, etc).................Yes
Was sufficient ice used (if appropriate)..Yes
All bottles arrived in good condition (unbroken)..Yes
Number of containers listed on COC match number received...............................Yes
Correct bottles used for the requested analyses..Yes
Analyses/bottles require preservation (attach preservation sheet excluding VOC).No
Sample split at ARI...No

Custody papers included with the cooler.. Yes
Was a temperature blank included in the cooler.............................. No
All bottles sealed in individual plastic bags.................................... No
All bottle labels complete and legible... Yes
Bottle labels and tags agree with COC.. Yes
All VOC vials free of air bubbles... No
Sufficient amount of sample sent in each bottle............................... Yes

Analysis	Due	TAT	Expires	Comments
19E0011-01 GP-801-GW [Water] Sampled 26-Apr-2019 09:00 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL				
8270D-SIM PAH Low (0.01 ug/L - 0.5	15-May-2019 15:00	10	03-May-2019 09:00	
19E0011-02 GP-802-GW [Water] Sampled 26-Apr-2019 16:35 (GMT-08:00) Pacific Time (US & Canada)				
A = Glass NM, Amber, 500 mL				
8270D-SIM PAH Low (0.01 ug/L - 0.5	15-May-2019 15:00	10	03-May-2019 16:35	

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: SLR

Project Name: Nord Door

COC No(s): ______ NA

Delivered by: Fed-Ex UPS [✓ Courier] Hand Delivered Other: ______

Assigned ARI Job No: 19E0011

Tracking No: ______ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? YES [✓ NO]

Were custody papers included with the cooler? .... [✓ YES] NO

Were custody papers properly filled out (ink, signed, etc.) .... [✓ YES] NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1335 2.6 ___ ___ ___ ___ ___

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: DOO7565

Cooler Accepted by: ______ Date: ~~4/~~ c8 5/1/19 Time: 1238

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? .... YES [✓ NO]

What kind of packing material was used? ... [✓ Bubble Wrap] [✓ Wet Ice] Gel Packs Baggies Foam Block Paper Other: ______

Was sufficient ice used (if appropriate)? .... NA [✓ YES] NO

How were bottles sealed in plastic bags? .... Individually Grouped [✓ Not]

Did all bottles arrive in good condition (unbroken)? .... [✓ YES] NO

Were all bottle labels complete and legible? .... [✓ YES] NO

Did the number of containers listed on COC match with the number of containers received? .... [✓ YES] NO

Did all bottle labels and tags agree with custody papers? .... [✓ YES] NO

Were all bottles used correct for the requested analyses? .... [✓ YES] NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ... NA YES [✓ NO]

Were all VOC vials free of air bubbles? .... [✓ NA] YES NO

Was sufficient amount of sample sent in each bottle? .... [✓ YES] NO

Date VOC Trip Blank was made at ARI........ [✓ NA] ______

Were the sample(s) split by ARI? [✓ NA] YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: ______ Date: ~~4~~ c8 5/2/19 Time: 0758 Labels checked by: c8

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

0016F
01/17/2018

Cooler Receipt Form

Revision 014A

Analytical Report

SLR International Corporation	Project: Former E.A, Nord	
22118 20th Avenue SE G202	Project Number: [none]	**Reported:**
Bothell WA, 98021	Project Manager: Chris Kramer	15-May-2019 11:25

GP-801-GW

19E0011-01 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM
Instrument: NT11 Analyst: VTS
Sampled: 04/26/2019 09:00
Analyzed: 05/09/2019 12:43

Sample Preparation:
Preparation Method: EPA 3510C SepF
Preparation Batch: BHE0086
Prepared: 03-May-2019
Sample Size: 500 mL
Final Volume: 0.5 mL
Extract ID: 19E0011-01 A 01

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	**0.077**	ug/L	
Chrysene	218-01-9	1	0.0009	0.010	**0.132**	ug/L	
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	**0.090**	ug/L	
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	**0.052**	ug/L	
Benzo(a)pyrene	50-32-8	1	0.002	0.010	**0.106**	ug/L	
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	**0.074**	ug/L	
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	**0.017**	ug/L	
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*88.9*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*96.0*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*97.0*	*%*	

SLR International Corporation
22118 20th Avenue SE G202
Bothell WA, 98021

Project: Former E.A, Nord
Project Number: [none]
Project Manager: Chris Kramer

Reported:
15-May-2019 11:25

GP-801-GW

19E0011-01RE1 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM
Instrument: NT11 Analyst: VTS
Sampled: 04/26/2019 09:00
Analyzed: 05/09/2019 14:14

Sample Preparation:
Preparation Method: EPA 3510C SepF
Preparation Batch: BHE0086
Prepared: 03-May-2019
Sample Size: 500 mL
Final Volume: 0.5 mL
Extract ID: 19E0011-01RE1 A 01

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	10	0.008	0.100	**0.104**	ug/L	D
Chrysene	218-01-9	10	0.009	0.100	**0.160**	ug/L	D
Benzo(b)fluoranthene	205-99-2	10	0.005	0.100	**0.099**	ug/L	J, D
Benzo(k)fluoranthene	207-08-9	10	0.032	0.100	**0.061**	ug/L	J, D
Benzo(a)pyrene	50-32-8	10	0.025	0.100	**0.122**	ug/L	D
Indeno(1,2,3-cd)pyrene	193-39-5	10	0.010	0.100	**0.123**	ug/L	D
Dibenzo(a,h)anthracene	53-70-3	10	0.013	0.100	**0.052**	ug/L	J, D
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*88.5*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*107*	*%*	
Surrogate: Fluoranthene-d10				*57-120 %*	*78.4*	*%*	

GP-802-GW

19E0011-02 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM
Instrument: NT11 Analyst: VTS

Sampled: 04/26/2019 16:35
Analyzed: 05/09/2019 13:13

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BHE0086
Prepared: 03-May-2019

Sample Size: 500 mL
Final Volume: 0.5 mL

Extract ID: 19E0011-02 A 01

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Benzo(a)anthracene	56-55-3	1	0.0008	0.010	ND	ug/L	U
Chrysene	218-01-9	1	0.0009	0.010	**0.001**	ug/L	J
Benzo(b)fluoranthene	205-99-2	1	0.0005	0.010	ND	ug/L	U
Benzo(k)fluoranthene	207-08-9	1	0.003	0.010	ND	ug/L	U
Benzo(a)pyrene	50-32-8	1	0.002	0.010	ND	ug/L	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.001	0.010	ND	ug/L	U
Dibenzo(a,h)anthracene	53-70-3	1	0.001	0.010	ND	ug/L	U
Surrogate: 2-Methylnaphthalene-d10				*42-120 %*	*94.7*	*%*	
Surrogate: Dibenzo[a,h]anthracene-d14				*29-120 %*	*127*	*%*	*
Surrogate: Fluoranthene-d10				*57-120 %*	*109*	*%*	

Semivolatile Organic Compounds - SIM - Quality Control

Batch BHE0086 - EPA 3510C SepF

Instrument: NT11 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BHE0086-BLK1)					Prepared: 03-May-2019 Analyzed: 09-May-2019 11:43						
Benzo(a)anthracene	ND	0.0008	0.010	ug/L							U
Chrysene	ND	0.0009	0.010	ug/L							U
Benzo(b)fluoranthene	ND	0.0005	0.010	ug/L							U
Benzo(k)fluoranthene	ND	0.003	0.010	ug/L							U
Benzo(a)pyrene	ND	0.002	0.010	ug/L							U
Indeno(1,2,3-cd)pyrene	ND	0.001	0.010	ug/L							U
Dibenzo(a,h)anthracene	ND	0.001	0.010	ug/L							U
Surrogate: 2-Methylnaphthalene-d10	0.266			ug/L	*0.300*		*88.6*	*42-120*			
Surrogate: Dibenzo[a,h]anthracene-d14	0.309			ug/L	*0.300*		*103*	*29-120*			
Surrogate: Fluoranthene-d10	0.310			ug/L	*0.300*		*103*	*57-120*			
LCS (BHE0086-BS1)					Prepared: 03-May-2019 Analyzed: 09-May-2019 12:13						
Benzo(a)anthracene	0.288	0.0008	0.010	ug/L	0.300		96.1	42-120			
Chrysene	0.292	0.0009	0.010	ug/L	0.300		97.4	44-120			
Benzo(b)fluoranthene	0.287	0.0005	0.010	ug/L	0.300		95.8	44-120			
Benzo(k)fluoranthene	0.321	0.003	0.010	ug/L	0.300		107	50-120			
Benzo(a)pyrene	0.295	0.002	0.010	ug/L	0.300		98.2	35-120			
Indeno(1,2,3-cd)pyrene	0.305	0.001	0.010	ug/L	0.300		102	37-120			
Dibenzo(a,h)anthracene	0.315	0.001	0.010	ug/L	0.300		105	34-120			
Surrogate: 2-Methylnaphthalene-d10	0.276			ug/L	*0.300*		*92.0*	*42-120*			
Surrogate: Dibenzo[a,h]anthracene-d14	0.349			ug/L	*0.300*		*116*	*29-120*			
Surrogate: Fluoranthene-d10	0.313			ug/L	*0.300*		*104*	*57-120*			

SLR International Corporation
22118 20th Avenue SE G202
Bothell WA, 98021

Project: Former E.A, Nord
Project Number: [none]
Project Manager: Chris Kramer

Reported:
15-May-2019 11:25

Certified Analyses included in this Report

Analyte	Certifications
EPA 8270D-SIM in Water	
Naphthalene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
2-Methylnaphthalene	ADEC,DoD-ELAP,NELAP,CALAP
1-Methylnaphthalene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Biphenyl	NELAP
Acenaphthylene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Acenaphthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Dibenzofuran	ADEC,DoD-ELAP,NELAP,CALAP
Fluorene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Phenanthrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Carbazole	NELAP
Fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(a)anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Chrysene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(b)fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(k)fluoranthene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(j)fluoranthene	ADEC,DoD-ELAP,NELAP,WADOE
Benzo(e)pyrene	NELAP
Benzo(a)pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Perylene	ADEC,NELAP,CALAP
Indeno(1,2,3-cd)pyrene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Dibenzo(a,h)anthracene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE
Benzo(g,h,i)perylene	ADEC,DoD-ELAP,NELAP,CALAP,WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
CALAP	California Department of Public Health CAELAP	2748	06/30/2019
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2020
WADOE	WA Dept of Ecology	C558	06/30/2019
WA-DW	Ecology - Drinking Water	C558	06/30/2019

Notes and Definitions

*	Flagged value is not within established control limits.
D	The reported value is from a dilution
J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

APPENDIX C

Laboratory Analytical Data Review

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

June 18, 2019

SLR International Corp
1800 Blankenship Road, Suite 440
West Linn, OR 97068
ATTN: Mr. Chris Kramer
ckramer@slrconsulting.com

SUBJECT: NORD, Data Validation

Dear Mr. Kramer,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on May 31, 2019. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #45192:

SDG #	**Fraction**
B3245, B3246 B3256	Polychlorinated Dioxins/Dibenzofurans, Polychlorinated Biphenyls as Congeners

The data validation was performed under Level IV validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- USEPA National Functional Guidelines for High Resolution Methods Data Review; April 2016

- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

L:\SLR\NORD\45192COV.wpd

ADV cc Chemistrysvcs@cape-inc.com

1,971 pages - ADV

Attachment 1

Level IV

LDC #45192 (SLR International Corp. - Bothell, WA / NORD)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PCB Cong. (1668C)		Dioxins (1613B)																											
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	B3245	05/31/19	06/21/19	0	9	0	9																										
B	B3246	05/31/19	06/21/19	2	0	-	-																										
C	B3256	05/31/19	06/21/19	6	0	-	-																										
Total	T/CR			8	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

L:\SLR\NORD\45192ST.wpd

LDC Report# 45192A21

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NORD

LDC Report Date: June 17, 2019

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Level IV

Laboratory: SGS North America, Inc.

Sample Delivery Group (SDG): B3245

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GP-MW-11-SS	B3246-01	Soil	04/25/19
GP-MW-12-SS	B3246-02	Soil	04/25/19
GP-MW-12-SS-18-19	B3246-03	Soil	04/25/19
GP-MW-13-SS	B3246-04	Soil	04/25/19
GP-MW-14-SS	B3246-05	Soil	04/25/19
GP-MW-16-SS	B3246-07	Soil	04/26/19
GP-MW-17-SS	B3246-08	Soil	04/26/19
GP-801-SS	B3246-09	Soil	04/26/19
GP-802-SS	B3246-010	Soil	04/26/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with a modified outline of the USEPA National Functional Guidelines (NFG) for High Resolution Superfund Methods Data Review (April 2016). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25%.

The static resolving power was less than or equal to 10,000 (10% valley definition) at m/z 330.9792 and greater than or equal to 8000 throughout the mass range.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs/PCDFs were within method and validation criteria.

The minimum S/N ratio was greater than or equal to 2.5 for each unlabeled compound and greater than or equal to 10 for each labeled compound.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within method and validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG B3245	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to compounds reported as EMPCs, data were qualified as estimated in nine samples.

No results were rejected in this SDG.

NORD
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG B3245

Sample	Compound	Flag	A or P	Reason
GP-MW-11-SS GP-MW-12-SS GP-MW-12-SS-18-19 GP-MW-13-SS GP-MW-14-SS GP-MW-16-SS GP-MW-17-SS GP-801-SS GP-802-SS	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)

NORD
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG B3245

No Sample Data Qualified in this SDG

NORD
Polychlorinated Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG B3245

No Sample Data Qualified in this SDG

LDC #: 45192A21

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/1/19

Page: 1 of 1

Reviewer:

2nd Reviewer:

SDG #: B3245

Laboratory: SGS North America, Inc.

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/~~ICV~~	A	RSD≤ 20/35
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	A	
XI.	Compound quantitation RL/LOQ/LODs	SW	All - EMPC - Jdets/A
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	GP-MW-11-SS	B3246-01	Soil	04/25/19
2	GP-MW-12-SS	B3246-02	Soil	04/25/19
3	GP-MW-12-SS-18-19	B3246-03	Soil	04/25/19
4	GP-MW-13-SS	B3246-04	Soil	04/25/19
5	GP-MW-14-SS	B3246-05	Soil	04/25/19
6	GP-MW-16-SS	B3246-07	Soil	04/26/19
7	GP-MW-17-SS	B3246-08	Soil	04/26/19
8	GP-801-SS	B3246-09	Soil	04/26/19
9	GP-802-SS	B3246-010	Soil	04/26/19
10				
11				

Notes:

	MB1 16666						

LDC #: 45192A21

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: A
2nd Reviewer:

Method: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 1613B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
IIIa. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled compounds and ≤ 35% for unlabeled compounds?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and labeled compound ≥ 10?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?		✓		
Were all concentrations for the unlabeled compounds and for labeled compounds within QC limits?			✓	
IV. Continuing calibration				
Was a continuing calibration performed at the beginning and end of each 12 hour period?	✓			
Were all concentrations for the unlabeled compounds and for labeled compounds within QC limits (Method 1613B, Table 6)?	✓			
Did all continuing calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	✓			
Was there contamination in the method blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 45192A21

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
X. Labeled Compounds				
Were labeled compounds within the 25-150% criteria?	✓			
Was the minimum S/N ratio of all labeled compound peaks > 10?	✓			
XI. Compound quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			✓	
Were the correct labeled compound, quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓ ~~✓~~		~~✓~~	
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound ≥2.5 and ≥10 for the labeled compound?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XIII. System performance				
System performance was found to be acceptable.	✓			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:____

LDC #: 45792A21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	11/26/18	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.00	1.00	1.03	1.03	4.3	4.3
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.16	1.16	1.15	1.15	2.0	2.1
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	1.11	1.11	1.11	1.11	3.4	3.4
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	0.99	0.99	0.99	5.4	5.3
			OCDF (^{13}C-OCDF)	1.05	1.04	1.06	1.06	2.6	2.6
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDF)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDF)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192A21

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: SL
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported	Recalculated	Reported	Recalculated
					Conc (CC)	Conc (CC)	%D	%D
1	190513B04	5/13/19	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.00	10	10		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.16	9.5	9.5		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	1.11	48.9	48.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	0.99	50.4	50.2		
			OCDF (^{13}C-OCDF)	1.05	98.5	98.4		
2	190513B13	5/13/19	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	↓	10.5	10.6		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)		10.1	10.1		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)		52.1	52.0		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)		51.2	50.9		
			OCDF (^{13}C-OCDF)		101	101		
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDF)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192A21

VALIDATION FINDINGS WORKSHEET
Ongoing Precision and Recovery Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The percent recoveries (%R) of the Ongoing Precision and Recovery (OPR) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA   Where: SSC = Spiked sample concentration
SSCD = Duplicate Spiked sample concentration
SA = Spike added

RPD = I SSC- SSCDI * 2/(SSC+ SSCD)

OPR ID: OPR1

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		OPR Percent Recovery		OPRD Percent Recovery		OPR/OPRD RPD	
	OPR	OPRD	OPR	OPRD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	10		10.2		NR	102				
1,2,3,7,8-PeCDD	50		50.3		↓	101				
1,2,3,4,7,8-HxCDD	↓		55.3			111				
1,2,3,4,7,8,9-HpCDF			50.7			101				
OCDF	100		106			106				

LDC #: 45192A21

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: R
2nd reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1 , F :

Conc. = $\frac{(1.14e7)(2000)(\quad)}{(1.29e7)(0.99)(16.35)(0.742)}$

= 147 pg/g

#	Sample ID	Compound	Reported Concentration (pg/g)	Calculated Concentration (pg/g)	Qualification
	1	F	149	147	—

LDC Report# 45192A31

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Nord

LDC Report Date: June 17, 2019

Parameters: Polychlorinated Biphenyls Congeners

Validation Level: Level IV

Laboratory: SGS North America, Inc.

Sample Delivery Group (SDG): B3245

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GP-MW-11-SS	B3246-01	Soil	04/25/19
GP-MW-12-SS	B3246-02	Soil	04/25/19
GP-MW-13-SS	B3246-04	Soil	04/25/19
GP-MW-14-SS	B3246-05	Soil	04/25/19
GP-MW-15-SS	B3246-06	Soil	04/26/19
GP-MW-16-SS	B3246-07	Soil	04/26/19
GP-MW-17-SS	B3246-08	Soil	04/26/19
GP-801-SS	B3246-09	Soil	04/26/19
GP-802-SS	B3246-010	Soil	04/26/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with a modified outline of the USEPA National Functional Guidelines (NFG) for High Resolution Superfund Methods Data Review (April 2016). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls Congeners by Environmental Protection Agency (EPA) Method 1668C

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all congeners. The chromatographic resolution between the congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187 was resolved with a valley of less than or equal to 40%.

The static resolving power was less than or equal to 10,000 (10% valley definition) at m/z 330.9792 and greater than or equal to 8000 throughout the mass range.

III. Initial Calibration and Initial Calibration Verification

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within QC limits.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB 16666	05/15/19	PCB-11 Total dichlorobiphenyl	2.68 pg/g 2.68 pg/g	All samples in SDG B3245

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
GP-MW-11-SS	PCB-11 Total dichlorobiphenyl	2.49 pg/g 3.77 pg/g	2.49U pg/g 3.77J pg/g
GP-MW-12-SS	PCB-11 Total dichlorobiphenyl	4.09 pg/g 9.46 pg/g	4.09U pg/g 9.46J pg/g
GP-MW-13-SS	PCB-11 Total dichlorobiphenyl	4.88 pg/g 10.5 pg/g	4.88U pg/g 10.5J pg/g
GP-MW-14-SS	PCB-11	8.15 pg/g	8.15U pg/g
GP-MW-15-SS	PCB-11	8.38 pg/g	8.38U pg/g
GP-MW-16-SS	PCB-11	7.08 pg/g	7.08U pg/g
GP-MW-17-SS	PCB-11 Total dichlorobiphenyl	5.61 pg/g 9.92 pg/g	5.61U pg/g 9.92J pg/g
GP-801-SS	PCB-11 Total dichlorobiphenyl	4.47 pg/g 12.8 pg/g	4.47U pg/g 12.8J pg/g
GP-802-SS	PCB-11	7.43 pg/g	7.43U pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG B3245	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

XII. Target Compound Identification

All target compound identifications were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
GP-MW-11-SS	PCB-8 PCB-15 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects)	P
GP-MW-12-SS	PCB-4 PCB-5 PCB-15 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects) J (all detects)	P

Sample	Compound	Finding	Criteria	Flag	A or P
GP-MW-13-SS	PCB-4 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects)	P
GP-MW-14-SS GP-MW-16-SS	PCB-4 PCB-6 PCB-13/12 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects) J (all detects)	P
GP-MW-15-SS	PCB-4 PCB-6 PCB-14 PCB-13/12 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
GP-MW-17-SS	PCB-4 PCB-8 PCB-15 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects) J (all detects)	P
GP-801-SS	PCB-4 PCB-6 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects)	P
GP-802-SS	PCB-10 PCB-5 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects)	P

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to compounds reported as EMPCs and single ion quantitation, data were qualified as estimated in nine samples.

Due to laboratory blank contamination, data were qualified as estimated or not detected in nine samples.

No results were rejected in this SDG.

Nord
Polychlorinated Biphenyls Congeners - Data Qualification Summary - SDG B3245

Sample	Compound	Flag	A or P	Reason
GP-MW-11-SS GP-MW-12-SS GP-MW-13-SS GP-MW-14-SS GP-MW-15-SS GP-MW-16-SS GP-MW-17-SS GP-801-SS GP-802-SS	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)
GP-MW-11-SS	PCB-8 PCB-15 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-MW-12-SS	PCB-4 PCB-5 PCB-15 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-MW-13-SS	PCB-4 Total dichlorobiphenyl	J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-MW-14-SS GP-MW-16-SS	PCB-4 PCB-6 PCB-13/12 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-MW-15-SS	PCB-4 PCB-6 PCB-14 PCB-13/12 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-MW-17-SS	PCB-4 PCB-8 PCB-15 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-801-SS	PCB-4 PCB-6 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-802-SS	PCB-10 PCB-5 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)

Nord
Polychlorinated Biphenyls Congeners - Laboratory Blank Data Qualification Summary - SDG B3245

Sample	Compound	Modified Final Concentration	A or P
GP-MW-11-SS	PCB-11 Total dichlorobiphenyl	2.49U pg/g 3.77J pg/g	A
GP-MW-12-SS	PCB-11 Total dichlorobiphenyl	4.09U pg/g 9.46J pg/g	A
GP-MW-13-SS	PCB-11 Total dichlorobiphenyl	4.88U pg/g 10.5J pg/g	A
GP-MW-14-SS	PCB-11	8.15U pg/g	A
GP-MW-15-SS	PCB-11	8.38U pg/g	A
GP-MW-16-SS	PCB-11	7.08U pg/g	A
GP-MW-17-SS	PCB-11 Total dichlorobiphenyl	5.61U pg/g 9.92J pg/g	A
GP-801-SS	PCB-11 Total dichlorobiphenyl	4.47U pg/g 12.8J pg/g	A
GP-802-SS	PCB-11	7.43U pg/g	A

Nord
Polychlorinated Biphenyls Congeners - Field Blank Data Qualification Summary - SDG B3245

No Sample Data Qualified in this SDG

LDC #: 45192A31

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/11/19

SDG #: B3245

Page: 1 of 1

Laboratory: SGS North America, Inc.

Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/~~ICV~~	A	RSD ≤ 20
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	A	
XI.	Compound quantitation RL/LOQ/LODs	SW	All - EMPC - Jdets/A
XII.	Target compound identification	SW	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

Note:
A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	GP-MW-11-SS	B3246-01	Soil	04/25/19
2	GP-MW-12-SS	B3246-02	Soil	04/25/19
3	GP-MW-13-SS	B3246-04	Soil	04/25/19
4	GP-MW-14-SS	B3246-05	Soil	04/25/19
5	GP-MW-15-SS	B3246-06	Soil	04/26/19
6	GP-MW-16-SS	B3246-07	Soil	04/26/19
7	GP-MW-17-SS	B3246-08	Soil	04/26/19
8	GP-801-SS	B3246-09	Soil	04/26/19
9	GP-802-SS	B3246-010	Soil	04/26/19
10				
11				

Notes:

LDC #: 45192A31

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 330.9792 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution (valley) between PCB 23 and PCB 34 and between PCB 182 and PCB 187 ≤ 40% ?	✓			
Is the static resolving power ≥10,000 at m/z 330.9792 and ≥ 8000 throughout the mass range?	✓			
Was the mass resolution adequately checked with PFK?	✓			
III. Initial calibration/Initial calibration verification				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤20% for unlabeled and labeled compounds?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard ≥ 10?	✓			
Were all initial calibration verification (ICV) percent differences (%D) within QC limits for unlabeled and labeled compounds?		✓		
IV. Continuing calibration				
Was a continuing calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) ≤25% for unlabeled and percent recoveries (%R) for labeled compounds within 50-145%?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard ≥ 10?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				

LDC #: 45192A31

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: R
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
X. Labeled Compounds				
Were labeled compound recoveries within the QC criteria?	✓			
Was the minimum S/N ratio of all labeled compound peaks > 10?	✓			
XI. Compound quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			✓	
Were the labeled compound, quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XIII. System performance				
System performance was found to be acceptable.	✓			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were all samples associated with a method blank?
[✓ Y] N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
[✓ Y] N N/A Was the method blank contaminated? If yes, please see qualification below.

Blank extraction date: 5/15/19 **Blank analysis date:** 5/19/19
Conc. units: pg/g **Associated samples:** All Qual U, Total J

Compound	Blank ID 16666	Sample Identification								
	MB1~~B3345~~	1	2	3	4	5	6	7	8	9
PCB-11	2.68	2.49	4.09	4.88*	8.15	8.38	7.08	5.61	4.47	7.43
Total Di-CB	2.68	3.77	9.46	10.5*				9.92	12.8	

*EMPC

Blank extraction date:_______ **Blank analysis date:**_______
Conc. units:_______ **Associated samples:**_______

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET
Target Compound Identification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y [✓ N] N/A Was the Ion Abundance Ratio for the two quantitation ions within criteria?
Y [✓ N] N/A Was the signal to noise ratio for each target compound and labeled standard > 2.5?
Y [✓ N] N/A Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?

#	Date	Sample ID	Associated Compounds	Finding	Qualifications
		1	PCB - 8, 15	Congeners were quantitated using single ion mode. The second ion is not integrated or reported due to PFK interference. Quantitation should be performed using the area of the primary and secondary ions.	Jdets/P (+ Total Di-CB)
		2	PCB - 4, 6, 15		
		3	PCB - 4		
		4, 6	PCB - 4, 6, 13/12		
		5	PCB - 4, 6, 14, 13/12		
		7	PCB - 4, 8, 15		
		8	PCB - 4, 6		
		9	PCB - 10, 5		

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
A_{is} = Area of associated internal standard
C_x = Concentration of compound,
C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs,
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported %RSD	Recalculated %RSD
1	ICAL	1/4/19	PCB 77 (^{13}C-PCB 77)	1.02	1.02	0.98	0.98	6.0	5.9
			PCB 105 (^{13}C-PCB 105)	0.96	0.96	0.96	0.96	7.9	7.9
			PCB 167 (^{13}C-PCB 167)	1.02	1.02	1.04	1.04	5.5	5.7
			PCB 189 (^{13}C-PCB 189)	1.02	1.02	0.97	0.97	7.6	7.7
2			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						
3			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	190519S01	5/19/19	PCB 77 (^{13}C-PCB 77)	1.02	0.97	0.98	4.7	4.3
			PCB 105 (^{13}C-PCB 105)	0.96	0.92	0.92	3.6	4.2
			PCB 167 (^{13}C-PCB 167)	1.02	0.95	0.95	6.4	6.9
			PCB 189 (^{13}C-PCB 189)	1.02	0.96	0.97	5.1	5.2
2	190520S03	5/20/19	PCB 77 (^{13}C-PCB 77)	1.02	0.99	0.99	3.0	2.6
			PCB 105 (^{13}C-PCB 105)	0.96	0.94	0.94	2.2	2.6
			PCB 167 (^{13}C-PCB 167)	1.02	1.00	1.01	1.0	1.4
			PCB 189 (^{13}C-PCB 189)	1.02	0.96	0.96	5.1	5.6
3			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					
4			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET

Ongoing Precision and Recovery Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent recoveries (%R) of the Ongoing Precision and Recovery (OPR) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA

Where: SSC = Spiked sample concentration
SSCD = Duplicate Spiked sample concentration
SA = Spike added

RPD = I SSC- SSCDI * 2/(SSC+ SSCD)

OPR ID: OPR1

Compound	Spike Added (pg/uL)		Spiked Sample Concentration (pg/uL)		OPR Percent Recovery		OPR D Percent Recovery		OPR/OPRD RPD	
	OPR	OPRD	OPR	OPRD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
PCB 15	50		49.1		98.2	98.2				
PCB 77	↓		48.6		97.2	97.2				
PCB 169			51.4		103	103				
PCB 206			52.9		106	106				

LDC #: 45192A31

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer: R
2nd reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
RRF	=	Relative Response Factor (average) from the initial calibration
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, PCB-8:

Conc. = $\frac{(1.87e5)(2000)(\quad)}{(5.04e7)(1.11)(13.52)(0.742)}$

= 0.666 pg/g

#	Sample ID	Compound	Reported Concentration (pg/g)	Calculated Concentration (pg/g)	Qualification
	1	PCB-8	0.667	0.666	-

LDC Report# 45192B31

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Nord

LDC Report Date: June 17, 2019

Parameters: Polychlorinated Biphenyls Congeners

Validation Level: Level IV

Laboratory: SGS North America, Inc.

Sample Delivery Group (SDG): B3246

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GP-801-GW	B3246-001	Water	04/26/19
GP-802-GW	B3246-002	Water	04/26/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with a modified outline of the USEPA National Functional Guidelines (NFG) for High Resolution Superfund Methods Data Review (April 2016). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls Congeners by Environmental Protection Agency (EPA) Method 1668C

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all congeners. The chromatographic resolution between the congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187 was resolved with a valley of less than or equal to 40%.

The static resolving power was less than or equal to 10,000 (10% valley definition) at m/z 330.9792 and greater than or equal to 8000 throughout the mass range.

III. Initial Calibration and Initial Calibration Verification

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within QC limits.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB1 16671	05/08/19	PCB-11 PCB-95 PCB-113/90/101 PCB-110 PCB-118 PCB-105 PCB-147/149 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total pentachlorobiphenyl Total hexachlorobiphenyl	13.3 pg/L 2.52 pg/L 3.31 pg/L 2.65 pg/L 2.41 pg/L 1.51 pg/L 2 pg/L 3.28 pg/L 3.25 pg/L 13.3 pg/L 12.4 pg/L 8.53 pg/L	All samples in SDG B3246

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
GP-801-GW	PCB-11	29.6 pg/L	29.6U pg/L
GP-802-GW	PCB-11 PCB-95 PCB-113/90/101 PCB-110 PCB-118 PCB-105 PCB-147/149 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total pentachlorobiphenyl Total hexachlorobiphenyl	21.7 pg/L 3.28 pg/L 4.41 pg/L 4.82 pg/L 4.5 pg/L 1.27 pg/L 3.84 pg/L 4.97 pg/L 4.88 pg/L 24 pg/L 18.3 pg/L 13.7 pg/L	21.7U pg/L 3.28U pg/L 4.41U pg/L 4.82U pg/L 4.5U pg/L 1.27U pg/L 3.84U pg/L 4.97U pg/L 4.88U pg/L 24J pg/L 18.3J pg/L 13.7J pg/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG B3246	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

XII. Target Compound Identification

All target compound identifications were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
GP-801-GW	PCB-10 PCB-5	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects)	P
GP-802-GW	PCB-8	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects)	P

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to compounds reported as EMPCs and single ion quantitation, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as estimated or not detected in two samples.

No results were rejected in this SDG.

Nord
Polychlorinated Biphenyls Congeners - Data Qualification Summary - SDG B3246

Sample	Compound	Flag	A or P	Reason
GP-801-GW GP-802-GW	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)
GP-801-GW	PCB-10 PCB-5	J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
GP-802-GW	PCB-8	J (all detects)	P	Target compound identification (single ion quantitation)

Nord
Polychlorinated Biphenyls Congeners - Laboratory Blank Data Qualification Summary - SDG B3246

Sample	Compound	Modified Final Concentration	A or P
GP-801-GW	PCB-11	29.6U pg/L	A
GP-802-GW	PCB-11 PCB-95 PCB-113/90/101 PCB-110 PCB-118 PCB-105 PCB-147/149 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total pentachlorobiphenyl Total hexachlorobiphenyl	21.7U pg/L 3.28U pg/L 4.41U pg/L 4.82U pg/L 4.5U pg/L 1.27U pg/L 3.84U pg/L 4.97U pg/L 4.88U pg/L 24J pg/L 18.3J pg/L 13.7J pg/L	A

Nord
Polychlorinated Biphenyls Congeners - Field Blank Data Qualification Summary - SDG B3246

No Sample Data Qualified in this SDG

LDC #: 45192B31

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/4/19

SDG #: B3246

Page: 1 of 1

Laboratory: SGS North America, Inc.S

Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/~~ICV~~	A	RSD ≤ 20
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	A	
XI.	Compound quantitation RL/LOQ/LODs	SW	All - EMPC - J dets A
XII.	Target compound identification	SW	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

Note:

	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	GP-801-GW	B3246-001	Water	04/26/19
2	GP-802-GW	B3246-002	Water	04/26/19
3				
4				
5				
6				
7				
8				
9				
10				

Notes:

	MB1 16671						

LDC #: 45192B31

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: K
2nd Reviewer:

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 330.9792 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution (valley) between PCB 23 and PCB 34 and between PCB 182 and PCB 187 ≤ 40% ?	✓			
Is the static resolving power ≥10,000 at m/z 330.9792 and ≥ 8000 throughout the mass range?	✓			
Was the mass resolution adequately checked with PFK?	✓			
III. Initial calibration/Initial calibration verification				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤20% for unlabeled and labeled compounds?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard ≥ 10?	✓			
Were all initial calibration verification (ICV) percent differences (%D) within QC limits for unlabeled and labeled compounds?			✓	
IV. Continuing calibration				
Was a continuing calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) ≤25% for unlabeled and percent recoveries (%R) for labeled compounds within 50-145%?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard ≥ 10?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				

LDC #: 45192B31

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
X. Labeled Compounds				
Were labeled compound recoveries within the QC criteria?	✓			
Was the minimum S/N ratio of all labeled compound peaks > 10?	✓			
XI. Compound quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	~~✓~~	✓	✓	
Were the labeled compound, quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XIII. System performance				
System performance was found to be acceptable.	✓			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were all samples associated with a method blank?
[✓ Y] N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
[✓ Y] N N/A Was the method blank contaminated? If yes, please see qualification below.

Blank extraction date: 5/8/19 **Blank analysis date:** 5/20/19
Conc. units: pg/L **Associated samples:** All Qualify U Total J

Compound	Blank ID	Sample Identification									
[redacted]	MB1 16671	5X	1	2							
PCB-11	13.3*	66.5	29.6	21.7							
PCB-95	2.52*	12.6		3.28							
PCB-113/90/101	3.31*	16.55		4.41							
PCB-110	2.65*	13.25		4.82							
PCB-118	2.41	12.05		4.5							
PCB-105	1.51*	7.55		1.27							
PCB-147/149	2*	10		3.84							
PCB-153/168	3.28	16.4		4.97							
PCB-163/138/129	3.25	16.25		4.88							
Total Di-CB	13.3*	66.5		24/J							
Total Penta-CB	12.4*	62		18.3/J							
Total Hexa-CB	8.53*	42.65		13.7/J							

*EMPC

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET
Target Compound Identification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y [✓ N] N/A Was the Ion Abundance Ratio for the two quantitation ions within criteria?
Y [✓ N] N/A Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?
Y [✓ N] N/A Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?

#	Date	Sample ID	Associated Compounds	Finding	Qualifications
		1	PCB-10, 5	Congeners were quantitated using single ion mode. The second ion is not integrated or reported due to PFK interference. Quantitation should be performed using the area of the primary and secondary ions.	Jdets/P (+ Total Di-CB)
		2	PCB-8		↓

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs,
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported %RSD	Recalculated %RSD
1	ICAL	1/4/19	PCB 77 (^{13}C-PCB 77)	1.02	1.02	0.98	0.98	6.0	5.9
			PCB 105 (^{13}C-PCB 105)	0.96	0.96	0.96	0.96	7.9	7.9
			PCB 167 (^{13}C-PCB 167)	1.02	1.02	1.04	1.04	5.5	5.7
			PCB 189 (^{13}C-PCB 189)	1.02	1.02	0.97	0.97	7.6	7.7
2			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						
3			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	190520S03	5/20/19	PCB 77 (^{13}C-PCB 77)	1.02	0.99	0.99	3.0	2.6
			PCB 105 (^{13}C-PCB 105)	0.96	0.94	0.94	2.2	2.6
			PCB 167 (^{13}C-PCB 167)	1.02	1.00	1.01	1.0	1.4
			PCB 189 (^{13}C-PCB 189)	1.02	0.96	0.96	5.1	5.6
2			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					
3			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					
4			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET
Ongoing Precision and Recovery Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent recoveries (%R) of the Ongoing Precision and Recovery (OPR) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA

Where:
SSC = Spiked sample concentration
SSCD = Duplicate Spiked sample concentration
SA = Spike added

RPD = I SSC- SSCDI * 2/(SSC+ SSCD)

OPR ID: OPR1

Compound	Spike Added (pg/uL)		Spiked Sample Concentration (pg/uL)		OPR Percent Recovery		OPR D Percent Recovery		OPR/OPRD RPD	
	OPR	OPRD	OPR	OPRD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB 15	50		51.2		102	102				
PCB 77	↓		50		100	100				
PCB 169	↓		54.6		109	109				
PCB 206	↓		53.8		108	108				

LDC #: 45192B31

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, PCB-3:

$$\text{Conc.} = \frac{(1.05e6)(2000)(\quad)}{(\quad)(\quad)(0.98)(\quad)}$$

= 34.56 pg/L

#	Sample ID	Compound	Reported Concentration (pg/L)	Calculated Concentration (pg/L)	Qualification
	1	PCB-3	34.2	34.6	✓

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Nord

LDC Report Date: June 17, 2019

Parameters: Polychlorinated Biphenyls Congeners

Validation Level: Level IV

Laboratory: SGS North America, Inc.

Sample Delivery Group (SDG): B3256

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-12-0519	B3256-003	Water	05/03/19
MW-13-0519	B3256-004	Water	05/03/19
MW-14-0519	B3256-005	Water	05/03/19
MW-15-0519	B3256-006	Water	05/03/19
MW-16-0519	B3256-007	Water	05/03/19
MW-17-0519	B3256-008	Water	05/03/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with a modified outline of the USEPA National Functional Guidelines (NFG) for High Resolution Superfund Methods Data Review (April 2016). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls Congeners by Environmental Protection Agency (EPA) Method 1668C

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J	(Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
U	(Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
UJ	(Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
R	(Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
NA	(Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all congeners. The chromatographic resolution between the congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187 was resolved with a valley of less than or equal to 40%.

The static resolving power was less than or equal to 10,000 (10% valley definition) at m/z 330.9792 and greater than or equal to 8000 throughout the mass range.

III. Initial Calibration and Initial Calibration Verification

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within QC limits.

The ion abundance ratios for all compounds were within validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each unlabeled compound and labeled compound.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB1 16680	05/15/19	PCB-11 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total hexachlorobiphenyl	10.2 pg/L 2.84 pg/L 2.77 pg/L 10.2 pg/L 5.61 pg/L	All samples in SDG B3256

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
MW-12-0519	PCB-11	15.8 pg/L	15.8U pg/L
MW-13-0519	PCB-11	44.1 pg/L	44.1U pg/L
MW-14-0519	PCB-11	17.6 pg/L	17.6U pg/L
MW-15-0519	PCB-11 PCB-153/168 Total dichlorobiphenyl Total hexachlorobiphenyl	18.6 pg/L 3.99 pg/L 18.6 pg/L 9.33 pg/L	18.6U pg/L 3.99U pg/L 18.6U pg/L 9.33J pg/L
MW-16-0519	PCB-11 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl	21.2 pg/L 7.59 pg/L 11.6 pg/L 25.1 pg/L	21.2U pg/L 7.59U pg/L 11.6U pg/L 25.1J pg/L
MW-17-0519	PCB-11 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total hexachlorobiphenyl	14.9 pg/L 3.61 pg/L 3.24 pg/L 14.9 pg/L 11.2 pg/L	14.9U pg/L 3.61U pg/L 3.24U pg/L 14.9U pg/L 11.2J pg/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Ongoing Precision Recovery

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
MW-12-0519	13-PCB-15	161 (5-145)	PCB-9 PCB-7 PCB-6 PCB-5 PCB-8 PCB-14 PCB-11 PCB-13/12 PCB-15 Total dichlorobiphenyl	J (all detects) UJ (all non-detects)	P
MW-12-0519	13C-PCB-19	155 (5-145)	PCB-19 PCB-30/18 PCB-17 PCB-27 PCB-24 PCB-16 PCB-32 Total trichlorobiphenyl	J (all detects) UJ (all non-detects)	P

XI. Compound Quantitation

All compound quantitations met validation criteria.

XII. Target Compound Identification

All target compound identifications were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
MW-12-0519 MW-14-0519	PCB-10 PCB-9 PCB-7 PCB-13/12 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
MW-13-0519	PCB-10 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects)	P
MW-16-0519	PCB-9 Total dichlorobiphenyl	Results were quantitated using single ion mode. The area for the secondary ion trace was not integrated due to significantly elevated noise levels from PFK.	The quantitation should be performed using the area of the primary and secondary ions.	J (all detects) J (all detects)	P

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to labeled compounds %R and single ion quantitation, data were qualified as estimated in four samples.

Due to laboratory blank contamination, data were qualified as estimated or not detected in six samples.

No results were rejected in this SDG.

Nord
Polychlorinated Biphenyls Congeners - Data Qualification Summary - SDG B3256

Sample	Compound	Flag	A or P	Reason
MW-12-0519	PCB-9 PCB-7 PCB-6 PCB-5 PCB-8 PCB-14 PCB-11 PCB-13/12 PCB-15 Total dichlorobiphenyl PCB-19 PCB-30/18 PCB-17 PCB-27 PCB-24 PCB-16 PCB-32 Total trichlorobiphenyl	J (all detects) UJ (all non-detects)	P	Labeled compounds (%R)
MW-12-0519 MW-14-0519	PCB-10 PCB-9 PCB-7 PCB-13/12 Total dichlorobiphenyl	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
MW-13-0519	PCB-10 Total dichlorobiphenyl	J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)
MW-16-0519	PCB-9 Total dichlorobiphenyl	J (all detects) J (all detects)	P	Target compound identification (single ion quantitation)

Nord
Polychlorinated Biphenyls Congeners - Laboratory Blank Data Qualification Summary - SDG B3256

Sample	Compound	Modified Final Concentration	A or P
MW-12-0519	PCB-11	15.8U pg/L	A
MW-13-0519	PCB-11	44.1U pg/L	A
MW-14-0519	PCB-11	17.6U pg/L	A
MW-15-0519	PCB-11 PCB-153/168 Total dichlorobiphenyl Total hexachlorobiphenyl	18.6U pg/L 3.99U pg/L 18.6U pg/L 9.33J pg/L	A

Sample	Compound	Modified Final Concentration	A or P
MW-16-0519	PCB-11 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl	21.2U pg/L 7.59U pg/L 11.6U pg/L 25.1J pg/L	A
MW-17-0519	PCB-11 PCB-153/168 PCB-163/138/129 Total dichlorobiphenyl Total hexachlorobiphenyl	14.9U pg/L 3.61U pg/L 3.24U pg/L 14.9U pg/L 11.2J pg/L	A

Nord
Polychlorinated Biphenyls Congeners - Field Blank Data Qualification Summary - SDG B3256

No Sample Data Qualified in this SDG

LDC #: 45192C31

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 6/14/19

SDG #: B3256

Page: 1 of 1

Laboratory: SGS North America, Inc.

Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/~~ICV~~	A	RSD ≤ 20
IV.	Continuing calibration	A	QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	SW	
XI.	Compound quantitation RL/LOQ/LODs	SW	All - EMPC - Jdet/A
XII.	Target compound identification	SW	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

Note:				
	A = Acceptable	ND = No compounds detected	D = Duplicate	SB=Source blank
	N = Not provided/applicable	R = Rinsate	TB = Trip blank	OTHER:
	SW = See worksheet	FB = Field blank	EB = Equipment blank	

	Client ID	Lab ID	Matrix	Date
1	MW-12-0519	B3256-003	Water	05/03/19
2	MW-13-0519	B3256-004	Water	05/03/19
3	MW-14-0519	B3256-005	Water	05/03/19
4	MW-15-0519	B3256-006	Water	05/03/19
5	MW-16-0519	B3256-007	Water	05/03/19
6	MW-17-0519	B3256-008	Water	05/03/19
7				
8				
9				
10				

Notes:

	MB1 16680						

LDC #: 45192C31

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer:
2nd Reviewer:

Method: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 330.9792 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution (valley) between PCB 23 and PCB 34 and between PCB 182 and PCB 187 $\leq$ 40% ?	✓			
Is the static resolving power $\geq$10,000 at m/z 330.9792 and $\geq$ 8000 throughout the mass range?	✓			
Was the mass resolution adequately checked with PFK?	✓			
III. Initial calibration/Initial calibration verification				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) $\leq$20% for unlabeled and labeled compounds?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard $\geq$ 10?	✓			
Were all initial calibration verification (ICV) percent differences (%D) within QC limits for unlabeled and labeled compounds?			✓	
IV. Continuing calibration				
Was a continuing calibration performed at the beginning of each 12 hour period?	✓			
Were all percent differences (%D) $\leq$25% for unlabeled and percent recoveries (%R) for labeled compounds within 50-145%?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and internal standard $\geq$ 10?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				

LDC #: 45192C31

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: R
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
X. Labeled Compounds				
Were labeled compound recoveries within the QC criteria?		✓		
Was the minimum S/N ratio of all labeled compound peaks ≥ 10?	✓			
XI. Compound quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?			✓	
Were the labeled compound, quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. Target compound identification				
For polychlorinated biphenyl congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For polychlorinated biphenyl congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For other polychlorinated biphenyl congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
Was an acceptable lock mass recorded and monitored?	✓			
XIII. System performance				
System performance was found to be acceptable.	✓			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were all samples associated with a method blank?
[✓ Y] N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
[✓ Y] N N/A Was the method blank contaminated? If yes, please see qualification below.

Blank extraction date: 5/15/19 **Blank analysis date:** 5/22/19

Conc. units: pg/L **Associated samples:** All Qualify U Total U,J

Compound	Blank ID	Sample Identification								
[redacted]	MB1 16680	5X	1	2	3	4	5	6		
PCB-11	10.2*	51	15.8	44.1	17.6	18.6	21.2	14.9		
PCB-153/168	2.84	14.2				3.99	7.59	3.61		
PCB-163/138/129	2.77*	13.85					11.6	3.24		
Total Di-CB	10.2*	51				18.6/U	25.1/J	14.9/U		
Total Hexa-CB	5.61*	28.05				9.33/J		11.2/J		

*EMPC

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET

Labeled Compounds

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y [✓ N] N/A Were all labeled compound recoveries and ion abundance ratios (IAR) within the QC criteria?

[✓ Y] N N/A Was the S/N ratio all labeled compound peaks ≥ 10?

#	Date	Lab ID/Reference	Labeled Compound	% Recovery/ Ion Abundance Ratio (Limit:)	Qualifications
		1 (dets/ND)	13C-PCB-15	161 (5-145)	J/UJ/P + Total Di-CB
			↓ 19	155 (↓)	↓ + Total Tri-CB
				( )	(see attached)
				( )	
				( )	
				( )	
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Analyte

Compound	Standard
PCB-1 2-MoCB	ES PCB-1
PCB-2 3-MoCB	ES PCB-3
PCB-3 4-MoCB	ES PCB-3
PCB-4 22'-DiCB	ES PCB-4
PCB-10 26-DiCB	ES PCB-4
PCB-9 25-DiCB	ES PCB-15
PCB-7 24-DiCB	ES PCB-15
PCB-6 23'-DiCB	ES PCB-15
PCB-5 23-DiCB	ES PCB-15
PCB-8 24'-DiCB	ES PCB-15
PCB-14 35-DiCB	ES PCB-15
PCB-11 33'-DiCB	ES PCB-15
PCB-13/12 34'/34-DiCB	ES PCB-15
PCB-15 44'-DiCB	ES PCB-15
PCB-19 22'6-TrCB	ES PCB-19
PCB-30/18 246/22'5-TrCB	ES PCB-19
PCB-17 22'4-TrCB	ES PCB-19
PCB-27 23'6-TrCB	ES PCB-19
PCB-24 236-TrCB	ES PCB-19
PCB-16 22'3-TrCB	ES PCB-19
PCB-32 24'6-TrCB	ES PCB-19
PCB-34 23'5'-TrCB	ES PCB-37
PCB-23 235-TrCB	ES PCB-37
PCB-26/29 23'5/245-TrCB	ES PCB-37
PCB-25 23'4-TrCB	ES PCB-37
PCB-31 24'5-TrCB	ES PCB-37
PCB-28/20 244'/233'-TrCB	ES PCB-37
PCB-21/33 234/23'4'-TrCB	ES PCB-37
PCB-22 234'-TrCB	ES PCB-37
PCB-36 33'5-TrCB	ES PCB-37
PCB-39 34'5-TrCB	ES PCB-37
PCB-38 345-TrCB	ES PCB-37
PCB-35 33'4-TrCB	ES PCB-37
PCB-37 344'-TrCB	ES PCB-37
PCB-54 22'66'-TeCB	ES PCB-54
PCB-77 33'44'-TeCB	ES PCB-77

Compound	Standard
PCB-50/53 22'46/22'56'-TeCE	ES PCB-81
PCB-45 22'36-TeCB	ES PCB-81
PCB-51 22'46'-TeCB	ES PCB-81
PCB-46 22'36'-TeCB	ES PCB-81
PCB-52 22'55'-TeCB	ES PCB-81
PCB-73 23'5'6-TeCB	ES PCB-81
PCB-43 22'35-TeCB	ES PCB-81
PCB-69/49 23'46/22'45'-TeCE	ES PCB-81
PCB-48 22'45-TeCB	ES PCB-81
PCB-44/47/65 ...-TeCB	ES PCB-81
PCB-59/62/75 ...-TeCB	ES PCB-81
PCB-42 22'34'-TeCB	ES PCB-81
PCB-41 22'34-TeCB	ES PCB-81
PCB-71/40 23'4'6/22'33'-TeCI	ES PCB-81
PCB-64 234'6-TeCB	ES PCB-81
PCB-72 23'55'-TeCB	ES PCB-81
PCB-68 23'45'-TeCB	ES PCB-81
PCB-57 233'5-TeCB	ES PCB-81
PCB-58 233'5'-TeCB	ES PCB-81
PCB-67 23'45-TeCB	ES PCB-81
PCB-63 234'5-TeCB	ES PCB-81
PCB-61/70/74/76 ...-TeCB	ES PCB-81
PCB-66 23'44'-TeCB	ES PCB-81
PCB-55 233'4-TeCB	ES PCB-81
PCB-56 233'4'-TeCB	ES PCB-81
PCB-60 2344'-TeCB	ES PCB-81
PCB-80 33'55'-TeCB	ES PCB-81
PCB-79 33'45'-TeCB	ES PCB-81
PCB-78 33'45-TeCB	ES PCB-81
PCB-81 344'5-TeCB	ES PCB-81
PCB-104 22'466'-PeCB	ES PCB-104
PCB-96 22'366'-PeCB	ES PCB-104
PCB-105 233'44'-PeCB	ES PCB-105
PCB-127 33'455'-PeCB	ES PCB-105
PCB-114 2344'5-PeCB	ES PCB-114
PCB-122 233'4'5'-PeCB	ES PCB-114

Compound	Standard
PCB-118 23'44'5-PeCB	ES PCB-118
PCB-103 22'45'6-PeCB	ES PCB-123
PCB-94 22'356'-PeCB	ES PCB-123
PCB-95 22'35'6-PeCB	ES PCB-123
PCB-100/93 22'44'6/22'356-P	ES PCB-123
PCB-102 22'456'-PeCB	ES PCB-123
PCB-98 22'34'6'-PeCB	ES PCB-123
PCB-88 22'346-PeCB	ES PCB-123
PCB-91 22'34'6-PeCB	ES PCB-123
PCB-84 22'33'6-PeCB	ES PCB-123
PCB-89 22'346'-PeCB	ES PCB-123
PCB-121 23'45'6-PeCB	ES PCB-123
PCB-92 22'355'-PeCB	ES PCB-123
PCB-113/90/101 ...-PeCB	ES PCB-123
PCB-83 22'33'5-PeCB	ES PCB-123
PCB-99 22'44'5-PeCB	ES PCB-123
PCB-112 233'56-PeCB	ES PCB-123
PCB-108/119/86/97/125...-Pe	ES PCB-123
PCB-117 234'56-PeCB	ES PCB-123
PCB-116/85 23456/22'344'-P	ES PCB-123
PCB-110 233'4'6-PeCB	ES PCB-123
PCB-115 2344'6-PeCB	ES PCB-123
PCB-82 22'33'4-PeCB	ES PCB-123
PCB-111 233'55'-PeCB	ES PCB-123
PCB-120 23'455'-PeCB	ES PCB-123
PCB-107/124 ...-PeCB	ES PCB-123
PCB-109 233'46-PeCB	ES PCB-123
PCB-106 233'45-PeCB	ES PCB-123
PCB-123 23'44'5'-PeCB	ES PCB-123
PCB-126 33'44'5-PeCB	ES PCB-126
PCB-155 22'44'66'-HxCB	ES PCB-155
PCB-152 22'3566'-HxCB	ES PCB-155
PCB-150 22'34'66'-HxCB	ES PCB-155
PCB-136 22'33'66'-HxCB	ES PCB-155
PCB-145 22'3466'-HxCB	ES PCB-155

Compound	Standard
PCB-148 22'34'56'-HxCB	ES PCB-153
PCB-151/135 ...-HxCB	ES PCB-153
PCB-154 22'44'56'-HxCB	ES PCB-153
PCB-144 22'345'6-HxCB	ES PCB-153
PCB-147/149 ...-HxCB	ES PCB-153
PCB-134 22'33'56-HxCB	ES PCB-153
PCB-143 22'3456'-HxCB	ES PCB-153
PCB-139/140 ...-HxCB	ES PCB-153
PCB-131 22'33'46-HxCB	ES PCB-153
PCB-142 22'3456-HxCB	ES PCB-153
PCB-132 22'33'46'-HxCB	ES PCB-153
PCB-133 22'33'55'-HxCB	ES PCB-153
PCB-165 233'55'6-HxCB	ES PCB-153
PCB-146 22'34'55'-HxCB	ES PCB-153
PCB-161 233'45'6-HxCB	ES PCB-153
PCB-153/168 ...-HxCB	ES PCB-153
PCB-141 22'3455'-HxCB	ES PCB-153
PCB-130 22'33'45'-HxCB	ES PCB-153
PCB-137 22'344'5-HxCB	ES PCB-153
PCB-164 233'4'5'6-HxCB	ES PCB-153
PCB-163/138/129 ...-HxCB	ES PCB-153
PCB-160 233'456-HxCB	ES PCB-153
PCB-158 233'44'6-HxCB	ES PCB-153
PCB-156/157 ...-HxCB	:S PCB-156/157
PCB-167 23'44'55'-HxCB	ES PCB-167
PCB-128/166 ...-HxCB	ES PCB-167
PCB-159 233'455'-HxCB	ES PCB-167
PCB-162 233'4'55'-HxCB	ES PCB-167
PCB-169 33'44'55'-HxCB	ES PCB-169
PCB-188 22'34'566'-HpCB	ES PCB-188
PCB-179 22'33'566'-HpCB	ES PCB-188
PCB-184 22'344'66'-HpCB	ES PCB-188
PCB-176 22'33'466'-HpCB	ES PCB-188
PCB-186 22'34566'-HpCB	ES PCB-188
PCB-178 22'33'55'6-HpCB	ES PCB-188

Compound	Standard
PCB-175 22'33'45'6-HpCB	ES PCB-180
PCB-187 22'34'55'6-HpCB	ES PCB-180
PCB-182 22'344'56'-HpCB	ES PCB-180
PCB-183 22'344'5'6-HpCB	ES PCB-180
PCB-185 22'3455'6-HpCB	ES PCB-180
PCB-174 22'33'456'-HpCB	ES PCB-180
PCB-177 22'33'45'6'-HpCB	ES PCB-180
PCB-181 22'344'56-HpCB	ES PCB-180
PCB-171/173 ...-HpCB	ES PCB-180
PCB-172 22'33'455'-HpCB	ES PCB-180
PCB-192 233'455'6-HpCB	ES PCB-180
PCB-180/193 ...-HpCB	ES PCB-180
PCB-191 233'44'5'6-HpCB	ES PCB-180
PCB-170 22'33'44'5-HpCB	ES PCB-170
PCB-190 233'44'56-HpCB	ES PCB-170
PCB-189 233'44'55'-HpCB	ES PCB-189
PCB-202 22'33'55'66'-OcCB	ES PCB-202
PCB-201 22'33'45'66'-OcCB	ES PCB-202
PCB-204 22'344'566'-OcCB	ES PCB-202
PCB-197 22'33'44'66'-OcCB	ES PCB-202
PCB-200 22'33'4566'-OcCB	ES PCB-202
PCB-198/199 ...-OcCB	ES PCB-202
PCB-196 22'33'44'56'-OcCB	ES PCB-202
PCB-203 22'344'55'6-OcCB	ES PCB-202
PCB-195 22'33'44'56-OcCB	ES PCB-205
PCB-194 22'33'44'55'-OcCB	ES PCB-205
PCB-205 233'44'55'6-OcCB	ES PCB-205
PCB-208 22'33'455'66'-NoCB	ES PCB-208
PCB-207 22'33'44'566'-NoCB	ES PCB-208
PCB-206 22'33'44'55'6-NoCB	ES PCB-206
PCB-209 DeCB	ES PCB-209

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET
Target Compound Identification

Page: 1 of 1
Reviewer: R
2nd Reviewer: Q

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y [✓ N] N/A Was the Ion Abundance Ratio for the two quantitation ions within criteria?
Y [✓ N] N/A Was the signal to noise ratio for each target compound and labeled standard > 2.5?
Y [✓ N] N/A Does the maximum intensity of each specified characteristic ion coincide within + 2 seconds (includes labeled standards)?

#	Date	Sample ID	Associated Compounds	Finding	Qualifications
		1, 3	PCB-10, 9, 7, 13/12	Congeners were quantitated using single ion mode. The	Jdets/P (+ Total Di-CB)
		2	↓ 10	second ion is not integrated or reported due to PFK	↓
		5	↓ 9	interference. Quantitation should be performed using the	↓
				area of the primary and secondary ions.	

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported %RSD	Recalculated %RSD
1	ICAL	1/4/19	PCB 77 (^{13}C-PCB 77)	1.02	1.02	0.98	0.98	6.0	5.9
			PCB 105 (^{13}C-PCB 105)	0.96	0.96	0.96	0.96	7.9	7.9
			PCB 167 (^{13}C-PCB 167)	1.02	1.02	1.04	1.04	5.5	5.7
			PCB 189 (^{13}C-PCB 189)	1.02	1.02	0.97	0.97	7.6	7.7
2			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						
3			PCB 77 (^{13}C-PCB 77)						
			PCB 105 (^{13}C-PCB 105)						
			PCB 167 (^{13}C-PCB 167)						
			PCB 189 (^{13}C-PCB 189)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192C31

Page: 1 of 1

Reviewer:

2nd Reviewer:

VALIDATION FINDINGS WORKSHEET

Continuing Calibration Results Verification

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound,
C_x = Concentration of compound,
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	190522S01	5/22/19	PCB 77 (^{13}C-PCB 77)	1.02	0.98	0.98	4.3	4.2
			PCB 105 (^{13}C-PCB 105)	0.96	0.96	0.96	0.3	0
			PCB 167 (^{13}C-PCB 167)	1.02	0.99	0.99	2.2	2.7
			PCB 189 (^{13}C-PCB 189)	1.02	0.93	0.94	8.0	8.3
2			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					
3			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					
4			PCB 77 (^{13}C-PCB 77)					
			PCB 105 (^{13}C-PCB 105)					
			PCB 167 (^{13}C-PCB 167)					
			PCB 189 (^{13}C-PCB 189)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET
Ongoing Precision and Recovery Results Verification

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

The percent recoveries (%R) of the Ongoing Precision and Recovery (OPR) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA

Where:
SSC = Spiked sample concentration
SSCD = Duplicate Spiked sample concentration
SA = Spike added

RPD = I SSC- SSCDI * 2/(SSC+ SSCD)

OPR ID: OPR1

Compound	Spike Added (pg/uL)		Spiked Sample Concentration (pg/uL)		OPR Percent Recovery		OPR D Percent Recovery		OPR/OPRD RPD	
	OPR	OPRD	OPR	OPRD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
PCB 15	50		50.4		101	101				
PCB 77	↓		50.5		101	101				
PCB 169			52.6		105	105				
PCB 206			55		110	110				

LDC #: 45192C31

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668C)

[✓ Y] N N/A Were all reported results recalculated and verified for all level IV samples?
[✓ Y] N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured
A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
I_s = Amount of internal standard added in nanograms (ng)
V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).
RRF = Relative Response Factor (average) from the initial calibration
Df = Dilution Factor.
%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, PCB-15:

Conc. = $\frac{(1.92e6)(2000)(\quad)}{(6.00e7)(0.97)(0.96)(\quad)}$

= 68.7 pg/L

#	Sample ID	Compound	Reported Concentration (pg/L)	Calculated Concentration (pg/L)	Qualification
	1	PCB-15	68.6	68.7	-

Summary of Source Control Evaluation to Assess Data Gaps for Completion of RI/FS (SLR, 2019)

Former E.A. Nord Door Site

Summary of Source Control Evaluation to Assess Data Gaps for Completion of RI/FS

Prepared for: JELD-WEN, Inc.
Client Ref: 108.00228.00048

January 2019

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global **environmental** and **advisory** solutions

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Summary of Source Control Evaluation to Assess Data Gaps for Completion of RI/FS

Prepared for:

JELD-WEN, Inc.
Klamath Falls, Oregon

This document has been prepared by SLR International Corporation. The material and data in this report were prepared under the supervision and direction of the undersigned.

/for

Christopher Kramer
Associate Scientist

R Scott Miller

R. Scott Miller, P.E.
Managing Principal

CONTENTS

Figures

Tables

Attachments

1. INTRODUCTION

SLR International Corporation (SLR) has prepared this summary of completed Source Control Evaluation (SCE) activities to Assess Data Gaps for Completion of the Remedial Investigation (RI)/Feasibility Study (FS) for the Former E.A. Nord Door facility (i.e. JELD-WEN Cleanup Site; FS ID 2757) located at 300 West Marine View Drive in Everett, Washington (Site). A Site Location Map is included as **Figure 1**. This summary report outlines activities completed per the December 2017 *SCE Work Plan to Address Data Gaps Identified in RI/FS and Draft Cleanup Action Plan* (SLR, 2017).

In addition, this summary report presents proposed additional assessment based on the findings of the SCE activities.

1.1 PURPOSE

The SCE activities presented in the SCE Work Plan focused on data gaps identified during Washington Department of Ecology (Ecology) initial review of the *Final Draft RI/FS and Draft Cleanup Action Plan* (SLR, 2016). Investigation activities at the Site were performed to meet the objectives in the Agreed Order for RI/FS Study and Draft Cleanup Action Plan (CAP) dated January 2, 2008.

1.2 OBJECTIVES

The overall objective of the RI/FS is to identify whether hazardous substances have been released to the environment; assess the nature, extent, and distribution of these substances; identify the potential migration pathways and receptors; assess the theoretical risk to human health and the environment; and generate or use data of sufficient quality for site characterization, risk assessment, and the subsequent analysis and selection of remedial alternatives.

The objective of the SCE activities presented in the SCE Work Plan was for further characterization of: 1) groundwater seeps; 2) the existing site stormwater drainage system; and, 3) the North Truck Dock (NTD) stormwater sump.

2. SOURCE CONTROL EVALUATION ACTIVITIES

Based on the findings of the RI, previous sampling conducted at the Site, and a series of communications with Ecology, the following additional investigation activities were completed to address identified data gaps. Sampling activities were completed per the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Health, Environmental, and Safety Plan (HSEP), included as Attachments to the SCE Work Plan.

SCE activities per the SCE Work Plan were completed for further characterization of groundwater seeps to Port Gardner Bay, the existing site stormwater drainage system, and the NTD stormwater sump.

2.1 GROUNDWATER SEEPS

Near-shore groundwater seep sampling was completed as a source control evaluation tool. An assessment of groundwater seeps observed discharging into Port Gardner Bay on the northern, western, and southern side of the Site was completed to identify potential impacts to surface water and sediment via groundwater seep drainage from the Site. The groundwater seep assessment consisted of identification of observed seeps during low tidal conditions, visual observations from identified seeps, and groundwater seep sampling of select groundwater seep locations along the shoreline of the Site.

The investigation of the groundwater seeps was completed in two phases: a groundwater seep survey followed by groundwater seep sampling.

2.1.1 GROUNDWATER SEEP SURVEY

From April 17 to 20, 2018, SLR completed a groundwater seep survey per the SCE Work Plan. **Figure 2** includes a Site Plan with locations of identified groundwater seeps and **Table 1** provides a summary of field measurements and observations from the seep survey. The groundwater seep survey included the following scope of work:

- Coordinated site access with the respective property owners to complete the proposed scope of work.
- Identified groundwater seeps that are accessible during low tidal conditions while considering observed seep flow, historical groundwater flow direction, access, and safety. Seeps along the northern, western, and southern side of the Site were assessed, and the locations were marked with a labelled flag and the approximate locations were drawn onto a scaled site plan. In addition, the marked groundwater seeps were surveyed by Signature Surveying (a Washington State licensed surveyor). A table of the surveyed coordinates is included as **Attachment 1**.
- Water quality parameters including specific conductance, pH, temperature, dissolved oxygen (DO), and oxidation reduction potential (ORP) were recorded using calibrated multi-parameter water quality meters on a grab sample from the seep locations during outgoing and incoming tidal stages. Water quality parameters were also recorded for the adjacent surface water during

the outgoing tidal stage. A summary of the water quality parameter measurements and field observations are included on **Table 1**.

- Per comments from Ecology on the draft SCE Work Plan, the "finger area" was the focus of the groundwater seep survey due to its proximity to identified contaminated areas; however, the entire northern, western, and southern shoreline (including the knoll area) was included as part of the groundwater seep survey.

Per the SCE Work Plan, proposed groundwater seep sampling locations were identified based on the findings of the groundwater seep survey described above. Considerations for the proposed groundwater seep sampling locations included access/safety, observed groundwater seep flow rate during the seep survey, proximity to areas with identified sediment impacts, and representativeness of significant observations or areas (i.e. unusually high flow areas).

The proposed groundwater seep sampling locations and rationale were submitted to Ecology in the May 11, 2018 *Summary of Groundwater Seep Survey and Proposed Groundwater Seep Sampling Plan* (SLR, 2018), and are summarized below.

- Seep-N-2: This observed groundwater seep is the nearest seep to the inland portion of the finger area that is directly attributable to the former E.A Nord property. This seep is also adjacent to previously identified sediment impacts. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for Total Petroleum Hydrocarbons - Diesel and Oil Range (TPH-Dx), carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs), naphthalene, benzene, and dioxins/furans.

- Seep-N-14: This observed groundwater seep is within the finger area. This seep is also adjacent to previously identified sediment impacts. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, and dioxins/furans.

- Seep-N-18/19: These observed groundwater seeps are within the finger area. These seeps are adjacent to each other. One of the seeps was sampled (Seep-N-19), determined on access and observed flow during the seep sampling event. This seep is also adjacent to previously identified sediment impacts. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, and dioxins/furans.

- Seep-S-1: This observed groundwater seep is on the south shoreline. This seep is also adjacent to previously identified sediment impacts. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, dioxins/furans, and Polychlorinated Biphenyl (PCB) congeners.

- Seep-S-9: This groundwater seep exhibited relatively high flow during the seep survey (along with Seep-S-7, Seep-S-8, and Seep-S-10). The seep is adjacent to the leased Cadman Asphalt property. The flow appeared to stay consistent throughout the seep survey period. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, and PCB congeners.

- Seep-S-14: This groundwater seep is the nearest seep to the previously identified TPH in upland Geoprobe location GP-24 adjacent to monitoring well MW-1. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, dioxins/furans, and PCB congeners.

- Seep-S-16: This groundwater seep is adjacent to the knoll area where upland impacts were previously identified in soil and groundwater. This seep is also in the vicinity of previously identified sediment impacts. This area has sufficient access and sufficient groundwater flow was observed during the seep survey for sample collection. This sample location was analyzed for TPH-Dx, cPAHs, naphthalene, benzene, dioxins/furans, and PCB congeners.

As presented in the *Proposed Groundwater Seep Sampling Plan*, alternate locations in the vicinity of the selected sampling locations were identified in case conditions restricted potential sample collection (i.e. access/safety issues or insufficient flow).

2.1.2 GROUNDWATER SEEP SAMPLING

From May 14 to 15, 2018, SLR completed a groundwater seep sampling event per the *SCE Work Plan* and the *Proposed Groundwater Seep Sampling Plan*. The groundwater seep sampling included the following scope of work:

- Near low tide, grab samples of water emitting from the selected groundwater seeps were collected directly into a clean laboratory-provided container by directing groundwater discharge from the groundwater seeps to the containers using a decontaminated vessel as necessary (i.e. Geoprobe sampler tube). At some locations, construction of an artificial channel was necessary to provide sufficient seep water for sample collection (see Photo Sheet in **Attachment 2**).

- Water quality parameters were measured and recorded as was completed for the April 2018 groundwater seep survey. Copies of field data sheets are included in **Attachment 3**.

- Groundwater seep samples were submitted to the analytical laboratory for the contaminants of potential concern (COPCs) identified in the seep sampling plan, and described above.

The groundwater flow from Seep location Seep-S-16 was observed to have a lack of groundwater seep flow during the seep sampling event. An alternate location was selected approximately 18 feet to the north of the original location. While this alternate location produced a slightly better flow, a channel in the sediment was constructed due to the low flow of the seep and the shallow grade of the shoreline. This method potentially introduced potentially-impacted sediment into the groundwater seep sample. Field notes for this sample location indicate the water was very turbid and black (see **Attachment 3**).

The duplicate sample from location Seep-S-16 was laboratory filtered with a 0.45-micron filter prior to sample extraction and analysis. The Seep-S-16 duplicate sample (DUPLICATE-0518) was analyzed for benzene and naphthalene, cPAHs, TPH-Dx, and PCB congeners.

2.1.2.1 Laboratory Analytical Results – Seep Sampling

Laboratory analytical results for groundwater seep samples with applicable Preliminary Cleanup Levels (PCLs) are summarized on **Table 2** and calculations used for toxic equivalent concentration (TEQ) values using the toxicity equivalency factors (TEF) for cPAHs, dioxin/furans, and PCB congeners are shown on **Table 3** (Ecology, 2015; Ecology, 2016). Copies of the laboratory analytical reports are included in **Attachment 4**. It should be noted that multiple discussions with Ecology have occurred regarding applicable PCLs. The PCLs presented in the summary tables included in this summary report are considered to be sufficient to screen the results of the SCE activities for their potential risk to human health and/or the environment and will be used for any proposed additional assessment.

Concentrations of benzene and naphthalene were not detected above the laboratory reporting limit in any of the seven seep locations sampled. TEQ cPAH concentrations using ½ the detection limit for non-detect values (ND= ½ DL) were below the applicable PCL at each of the seven sample locations. TPH-Dx was not measured above the laboratory reporting limit at seeps N-2, N-14, S-1, S-14, or S-16 and concentrations of TPH-Dx measured at seeps N-18 and S-9 were below the applicable PCL. Dioxins/furans TEQ values using ND= ½ DL were measured below the applicable PCL at the seep locations selected for dioxin/furan analysis.

Total PCB congeners were measured above the applicable PCL (per human health Surface Water Applicable or Relevant and Appropriate Requirement [ARAR] from Model Toxics Control Act [MTCA]) at the four locations selected for PCB congeners analysis, with elevated concentrations observed at Seep-S-16 (located adjacent to the knoll area). The TEQ value for dioxin-like PCB congeners was measured below the practical quantitation limit (PQL) at all four sample locations.

2.1.3 FINDINGS – GROUNDWATER SEEPS

A *Summary of Groundwater Seep Sampling* was submitted to Ecology on August 29, 2018 (SLR, 2018). The findings presented in that summary document are summarized below.

The only exceedance of applicable PCLs was for Total PCB congeners observed at seep sample locations Seep-S-1, Seep-S-9, Seep-S-14, and Seep-S-16; however, concentrations of dioxin-like PCB congeners calculated using the TEF methodology were below the PQL at each of these locations.

Previous upland assessments at the knoll area have been conducted including Geoprobe borings in 2009 and 2012 and test pitting with soil sampling in 2012. Two groundwater samples (GP-334 and GP-335) and ten soil samples were collected from within the knoll area and analyzed for PCB Aroclors. Only two soil samples measured a single PCB Aroclor above the laboratory reporting limit, and neither of these detections was measured above the PCL presented in the RI/FS. Sediment samples adjacent to seep location Seep-S-16 have measured PCB congeners above applicable PCLs in previous investigations. The construction of a channel in the sediment was necessary for groundwater seep sample collection due to the low flow of the seep and the shallow grade; however, this appears to have introduced colloidal interference (turbidity) into the water sample that was not removed by laboratory filtering of the duplicate sample. The seep sample with the highest observed turbidity had the highest total PCB congeners which was unaffected by laboratory filtering.

2.2 EXISTING STORMWATER DRAINAGE SYSTEM

While door manufacturing at the Site ceased in 2005, the Industrial Stormwater General Permit for the door manufacturing operations was not terminated until March 2007 (see Attachment 5 of the SCE Work Plan). As a component to the SCE, an assessment of the Site stormwater drainage system configuration was completed to locate and identify current and/or historical outfalls, drainage system collection points, pipe locations, and the approximate drainage areas for the collection points.

The SCE activities did not address cleanup of the stormwater drainage system or characterization of stormwater and storm drain solids (with the exception of the NTD stormwater sump, described below). Any potential cleanout of the stormwater drainage system or long-term stormwater monitoring may be considered as part of the upland cleanup alternatives.

2.2.1 STORMWATER DRAINAGE SYSTEM TRACING

On April 4, 2018 SLR completed a site walk to compare the stormwater system components identified on the site plan depicted on the 2005 SWPPP to the existing site conditions and to identify potential access points for the proposed assessment.

Based on the findings of the site walk, on April 5, 6, and 9, 2018, SLR subcontracted APS (utility locating service provider) to trace identified catch basins, outfalls, and roof drain connections with an electro-magnetic tracer line. The results of the tracing were marked on the surface and photographed. SLR documented the findings on a scaled site plan, utilizing a measuring wheel and taking measurements in reference to existing site features. It should be noted that the accuracy of the site plan should only be considered accurate to the degree implied by the method used. Additional tracing was completed in select storm lines with a tracer line affixed with a camera to assess pipe material, pipe condition (cracks/breaks), piping diameter, significant debris accumulation or blockage, and to identify other pipe connections.

The findings of the stormwater drainage system tracing are presented on **Figure 3** and detailed in **Table 4**. Forty-one catch basins, thirteen downspouts, and ten outfalls were identified. It should be noted that several additional downspouts were identified which appeared to discharge onto the site's surface and drain as sheet flow, therefore they were not noted within this scope.

2.2.2 FINDINGS - STORMWATER DRAINAGE SYSTEM TRACING

The subject property appears to support a network of stormwater lines which discharge towards the northern 'finger area', southern tidal flat, and the stormwater network below the west-adjacent West Marine View Drive. The stormwater lines generally consist of 4-inch to 12-inch lines constructed with either concrete or PVC. In general, the concrete storm lines were constructed in jointed segments. The PVC stormwater lines appeared in overall good condition and no major breaks or fractures were observed during the video inspections.

Based on the findings from this assessment, it appears that the storm lines have not been serviced or cleaned for several years and many of the catch basins and stormwater lines were partially or completely filled with sediment, debris, and/or stagnant water. Several of the lines were completely blocked with sediment or debris, which made tracing of those lines unsuccessful. Several of the catch basins were filled with sediment and/or vegetation and did not allow sufficient drainage at the time of our field work. When possible, the sediment and/or vegetation was removed to assess the condition and functionality of the catch basin(s) and stormwater lines. It could not be determined when the blockages occurred or whether they can be directly attributed to former JELD-WEN operations.

Outfall designated OF-4 was observed to have continuous water discharging from it regardless of recent precipitation events. Based on the camera tracing, it appears that water infiltrates the pipe between the first 40 to 150 feet of the line, nearest the outfall. The source of the water was not identified during the camera tracing due to the in-line water stirring up debris and distorting the images.

Modifications to the stormwater system were performed by the site property owner during summer of 2018, including redirecting downspout connections DS-1 and DS-2 from the NTD to an existing on-site catch basin.

While additional catch basins and a varying stormwater system configuration were observed, the general stormwater system drainage system was relatively similar to that presented in the 2005 SWPPP. No non-stormwater connections were observed during this assessment. The water discharging from OF-4 appeared to be water infiltration (groundwater) and not a connection.

2.3 NORTH TRUCK DOCK STORMWATER SUMP

As part of the stormwater drainage assessment, the stormwater sump in the North Truck Dock (NTD) area was traced and mapped by the utility locating service, and samples were collected of water entering the sump, solids inside the sump, and soil adjacent to observed current and historical discharge points.

2.3.1 NORTH TRUCK DOCK STORMWATER SUMP PIPING TRACING

On April 4th and 5th, 2018, SLR completed an investigation focused on the NTD stormwater sump located adjacent to the north entrance to the Site. The following section presents a summary of the findings from the sump piping tracing, sump solids sampling, and sump inlet water sampling.

SLR met with APS on April 5, 2018 to trace the NTD sump piping. **Figure 5** presents a zoom-in of the sump area and identified stormwater lines during this assessment. The NTD sump pump pumps water into a black 3-inch PVC above ground pipe to the edge of the loading dock retaining wall. The black PVC line has a series of elbow fittings and a cleanout, which then ties into a belowground 6-inch white PVC pipe which discharges to the northern side of the property. The 6-inch PVC formerly made a 90 degree elbow and continued to the west along the concrete wall and chain-link fence on the northwestern edge of the property. The 90 degree elbow was broken at the time of the assessment and it is not known when this connection was altered. The former continuation of pipe from the broken connection towards the finger area is both aboveground and shallowly below ground. The former discharge point is aboveground and clear of debris, which terminates approximately 80 feet from the finger area. Photos from the sump tracing are included on **Figure 4**.

Inlets to the NTD sump include a 3-inch inlet and 8-inch inlet on the southwest side of the sump. The 3-inch line was found to be connected to the adjacent strip drain in the NTD and also tied to a roof downspout at the corner of the Main Warehouse Building (identified as DS-1 on Figure 4). The 8-inch line was found to be connected to a roof downspout within the Main Warehouse Building (identified as DS-2 on Figure 4). In addition, two weep holes or ring lift holes were observed during the water sampling activities (described below).

Upon discussions with the current property owner, SLR understands that the following activities have been performed at the NTD area by the current property owner:

- Plugged the two weep holes and confirmed that water is not entering the sump through the plugged weep holes.
- Cleaned dirt and debris from the NTD area and stockpiled that material on plastic and covered with plastic, per Ecology's recommendation.
- Replaced the sump pump and redirected the sump discharges to an on-site catch basin west of the NTD area.
- Temporarily redirected the rood downspout at the NE corner of the building to drain across the sidewalk and into the City of Everett stormwater drainage system. The roof downspout was reconnected and drains to the NTD trench drain/sump where it is pumped to the on-property stormwater catch basin.
- The current property owner has engaged in on-going communications with the Port of Everett and the City of Everett regarding drainage from West Marine View Drive onto the property and in the NTD area.

With these changes to the drainage in the NTD area the water entering the NTD area is limited to surface stormwater drainage, stormwater from an internal roof drain that connects to the sump via plastic piping, and stormwater from the roof drain from the NE corner of the building that discharges to the NTD trench drain and into the sump. The discharge from the NTD sump no longer discharges to the Port of Everett property. The water in the sump is pumped to an on-property stormwater catch basin.

2.3.2 SUMP INLET WATER SAMPLING

On April 4th and 5th, 2018 SLR met Ecology to collect samples from the NTD sump per the *SCE Work Plan*. This assessment was completed during a rain event. The sump pump was enabled to discharge water from the sump and any water backed up in the piping was allowed to completely drain into the sump, before being pumped out. Continuous flow was observed from two inlets to the sump: a 3-inch line on the southwest side of the sump (sample ID of NTD-SW-3”-0418) and an 8-inch line on the southwest side of the sump (sample ID of NTD-SW-8”-0418). The 8-inch line appeared to have increased flow related with an increase in precipitation. Stormwater samples were collected directly into laboratory-provided containers for the site COPCs from each of these inlets. In addition, water quality parameters were recorded with a multi-parameter meter after conditions were allowed to equilibrate for approximately two minutes. Two weep holes or lift holes were observed discharging to the sump and samples were collected with a decontaminated stainless steel cup and transferred into laboratory-provided containers from the water discharging to the sump from these holes (sample IDs of NTD-SW-West-0418 and NTD-SW-East-0418). These water samples were also submitted for laboratory analysis of site COPCs.

Field parameter and laboratory analytical results are summarized on **Table 5**. Copies of the laboratory analytical reports are included in **Attachment 4**.

2.3.3 SUMP SOLIDS SAMPLING

One grab sample was collected of the sump solids and analyzed for site COPCs (sample ID of NTD-SED-0418). This sample was collected with a decontaminated stainless steel spoon after the sump pump was enabled to drain the contents of the sump. Laboratory analytical results are summarized on **Table 6** and copies of the analytical reports are included in **Attachment 4**.

Findings from the NTD investigation were submitted to Ecology via the *North Truck Dock Stormwater Sump Investigation Summary* (SLR, 2018).

2.3.4 NORTH TRUCK DOCK DISCHARGE SOIL SAMPLING

The NTD discharge point soil sampling was completed by SLR on July 9, 2018. Mr. Mahbub Alam (Ecology) was on-site during the sampling activities. Based on discussions with Ecology concerning the *North Truck Dock Stormwater Sump Investigation Summary*, the following scope of work was completed for the soil sampling on the Port of Everett property.

- Two (2) composite soil samples were collected: one composite sample from the approximate area of the disconnected discharge pipe (NTD-SED-A); and, one composite sample from the approximate original terminus of the discharge pipe (NTD-SED-B). These sample locations are shown on **Figure 4**.

- The composite soil samples consisted of three aliquots of soil of similar volume collected with a decontaminated stainless steel spoon and gently composited in a decontaminated stainless steel bowl and then placed directly into laboratory-provided containers with appropriate preservative (with the exception of volatiles analysis, which was collected per the 5035 method from in-situ soil).

- The sample aliquots were collected from within one horizontal foot of the current discharge point and below the uppermost plant root zone to limit potential organic interference in the laboratory analyses.

2.3.5 LABORATORY ANALYTICAL RESULTS – NORTH TRUCK DOCK INVESTIGATION

Low concentrations of some COPCs were measured in the stormwater inlet water samples, including naphthalene, TPH-Dx (diesel and residual range), dioxins/furans, and PCB congeners; however, concentrations of naphthalene and dioxins/furans were measured below the PCLs. The concentration of TPH-Dx (diesel range) in sump samples NTD-SW-East-0418 and NTD-SW-West-0418, and TPH-Dx (residual range) in NTD-SW-West-0418 measured above the PCLs. It should be noted that a laboratory procedure to remove potential organic interference (silica gel cleanup) was not performed on these samples per Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Publication No. 10-09-057). Concentrations of Total PCB congeners observed at each of the water sample locations exceeded the PCL (based on ARAR Human Health criteria); however, concentrations of dioxin-like PCB congeners calculated using the TEF methodology were below the PCL at each of these locations.

Concentrations of benzene, naphthalene, cPAHs, TPH-Dx, and PCB congeners in the sump solids sample measured below the PCLs. The TEQ value for dioxins/furans measured 102 picograms per gram (pg/g), which is above the PCL of 6.3 pg/g based on the laboratory PQL (**Table 6**).

Based on the dialogue with Ecology concerning the *North Truck Dock Stormwater Sump Investigation Summary*, the discharge point soil samples were analyzed for the site COPCs and conventional parameters (Total Volatile Solids [TVS], Total Solids, Ammonia Nitrogen, Total Organic Carbon [TOC], and Grain Size).

A summary of the laboratory analytical results with a comparison to PCLs and the results of the NTD sump solids sample is provided on **Table 6**.

Benzene, naphthalene, TPH-Dx (Diesel Range), and PCB congeners (total and TEQ) were measured below the PCLs in both soil samples. Concentrations of cPAHs (TEQ) and dioxins/furans (TEQ) were measured above the PCLs in both soil samples. In addition, TPH-Dx (Residual Range) was measured above the PCL in NTD-SED-B (identified as most closely resembling motor oil in the laboratory report narrative). Copies of the laboratory analytical reports are included as **Attachment 4**.

2.3.6 FINDINGS – NORTH TRUCK DOCK INVESTIGATION

It was previously identified that surface drainage into the NTD area includes drainage from West Marine View Drive. Weep holes or ring lift holes were identified in the NTD sump and water samples were collected. The weep holes were subsequently plugged. Line tracing identified only stormwater piping was connected to the NTD sump, primarily via roof drain piping.

Two composited soil samples were collected on the Port of Everett property at the locations shown on **Figure 5**. The sample collection and analysis was completed per the SCE Work Plan, communications with Ecology, the June 26, 2018 Proposal for Soil Sampling – Port of Everett, and the access agreement between JELD-WEN and the Port of Everett. The laboratory-measured concentrations of benzene, naphthalene, TPH-Dx (Diesel Range), and PCBs (total and TEQ) were below the PCLs in both samples. Concentrations of cPAHs (TEQ) and dioxins/furans (TEQ) were measured above the PCLs in both soil samples. TPH-Dx (Residual Range) was measured above the PCL in soil sample NTD-SED-B.

2.4 DATA QUALITY OBJECTIVES

The completed number of sampling locations, sampling depths, types of samples, and types of laboratory analysis were selected to meet the objective of the RI/FS and were proposed in the SAP and QAPP (Attachment 2 and 3 of the SCE Work Plan).

The data quality objectives (DQOs) for the RI/FS are designed to ensure that data of sufficient quality and quantity will be available to identify if hazardous compounds are present at the Site, evaluate risks posed by the presence of hazardous compounds, and identify if hazardous compounds may pose unacceptable risk to current and future human and ecological receptors via direct contact or migration.

Below is a summary of DQOs for the SCE activities.

Field Duplicate

One duplicate sample was collected from groundwater seep sample Seep-S-16 and analyzed for applicable COPCs. The relative percent difference (RPD) for Total PCB congeners was 0% (16,200 pg/L was measured in both the parent and the duplicate sample).

Laboratory Methods

Laboratory analysis of cPAHs was performed by the laboratory utilizing the 8270SIM method, as opposed to the 8310LL method that was proposed in the Work Plan. The TEQ PQL for the 8310LL method based on the laboratory reporting limit was calculated at 0.015 µg/L. When using the laboratory detection limit on the individual batch of samples per the 8270SIM method, a TEQ of 0.008 ug/L was achieved.

Data Validation and Data Reporting

Laboratory analytical results were validated per Section 4 of the QAPP including completing EPA validation level for all analytes. Future sampling for dioxin/furan and PCB Congener results will be evaluated by a third-party data analysis firm per the EPA4 validation level as required by the 2018 Ecology EIM database policy.

3. RECOMMENDATIONS FOR ADDITIONAL ASSESSMENT

This section provides recommendations for additional assessment based on the findings of the SCE activities.

3.1 GROUNDWATER SEEPS

Identified exceedances of applicable PCLs in groundwater seep samples was for Total PCB congeners observed at seep sample locations Seep-S-1, Seep-S-9, Seep-S-14, and Seep-S-16; however, concentrations of dioxin-like PCB congeners calculated using the TEF methodology were below the PCL at each of these locations.

Seep-S-16 had notably higher concentrations of Total PCB congeners and TEF concentration compared to the other seep samples; therefore, additional assessment is proposed for this area. Despite filtering the duplicate sample from Seep-S-16 by the laboratory, the concentration of Total PCB congeners was consistent between the parent sample and the filtered duplicate sample and it appears that laboratory filtering did not effectively remove PCB-contaminated sediment colloidal interference from the groundwater seep sample. It is our opinion that bulk water testing from the groundwater seep will not effectively remove PCB-contaminated sediment colloidal interference.

To assess the upland groundwater conditions that may be contributing to the groundwater seep concentrations measured at Seep-S-16, JELD-WEN proposes to install one permanent groundwater monitoring well in the upland area adjacent to the shoreline and Seep-S-16, pending access and safety issues. This monitoring well will be installed by a Washington-licensed drilling subcontractor and will be properly developed per Ecology guidelines. Upon completion of well installation and development activities, one groundwater sampling event will be conducted for PCB Congeners during outgoing tidal conditions. JELD-WEN understands that Ecology may request additional sampling events for PCB congeners to represent the cyclical nature of the groundwater system, or analysis of additional site COPCs at this well location.

3.2 EXISTING STORMWATER DRAINAGE SYSTEM

The Site appears to support a network of stormwater lines which discharge towards the northern 'finger area', southern tidal flat, and the stormwater network below the west-adjacent West Marine View Drive. The stormwater lines generally consist of 4-inch to 12-inch lines constructed with either concrete or PVC. In general, the concrete storm lines were constructed in jointed segments. The PVC stormwater lines appeared in overall good condition and no major breaks or fractures were observed.

Outfall designated OF-4 was observed to have continuous water discharging from it regardless of recent precipitation events. Based on the camera tracing, it appears that water infiltrates the pipe between the first 40 to 150 feet of the line, nearest the outfall. The source of the water was not identified during the camera tracing due to the in-line water stirring up debris and distorting the images. As stated below, catch basins have recently been modified to include discharge from downspouts that formerly discharged to the NTD sump.

No additional assessment is proposed for the existing stormwater drainage system; however, any potential cleanout of the stormwater drainage system or long-term stormwater monitoring would be considered as part of the upland cleanup alternatives.

3.3 NORTH TRUCK DOCK STORMWATER SUMP

Line tracing identified only stormwater piping was connected to the NTD sump, primarily via roof drain piping. It was previously identified that surface drainage into the NTD area includes drainage from West Marine View Drive. Weep holes or ring lift holes were identified in the NTD sump and water samples were collected. Modifications to the stormwater system were performed by the site property owner during summer of 2018, including plugging the weep holes in the sump and redirecting downspout connections DS-1 and DS-2 from the NTD sump to an existing on-property catch basin.

Based on discussions with Ecology and the Port of Everett (property owner of the adjacent site), additional assessment of the NTD discharge area will be conducted by Port of Everett as part of the RI/FS being conducted for the Former Baywood Site.

4. CONCLUSION

SLR requests a telephone conversation with Ecology to discuss the contents of this document and the recommended scope of additional assessment. Once Ecology has approved the additional assessment scope, SLR will prepare a work plan addendum with the appropriate details and QAPP changes to include EPA data validation of dioxin/furan and PCB congeners results using a third-party data analysis firm following Ecology's EIM database policy. The additional assessment proposed is intended to complete the Source Control Evaluation work at the Site, allowing for completion of the Remedial Investigation and Feasibility Study.

5. REFERENCES

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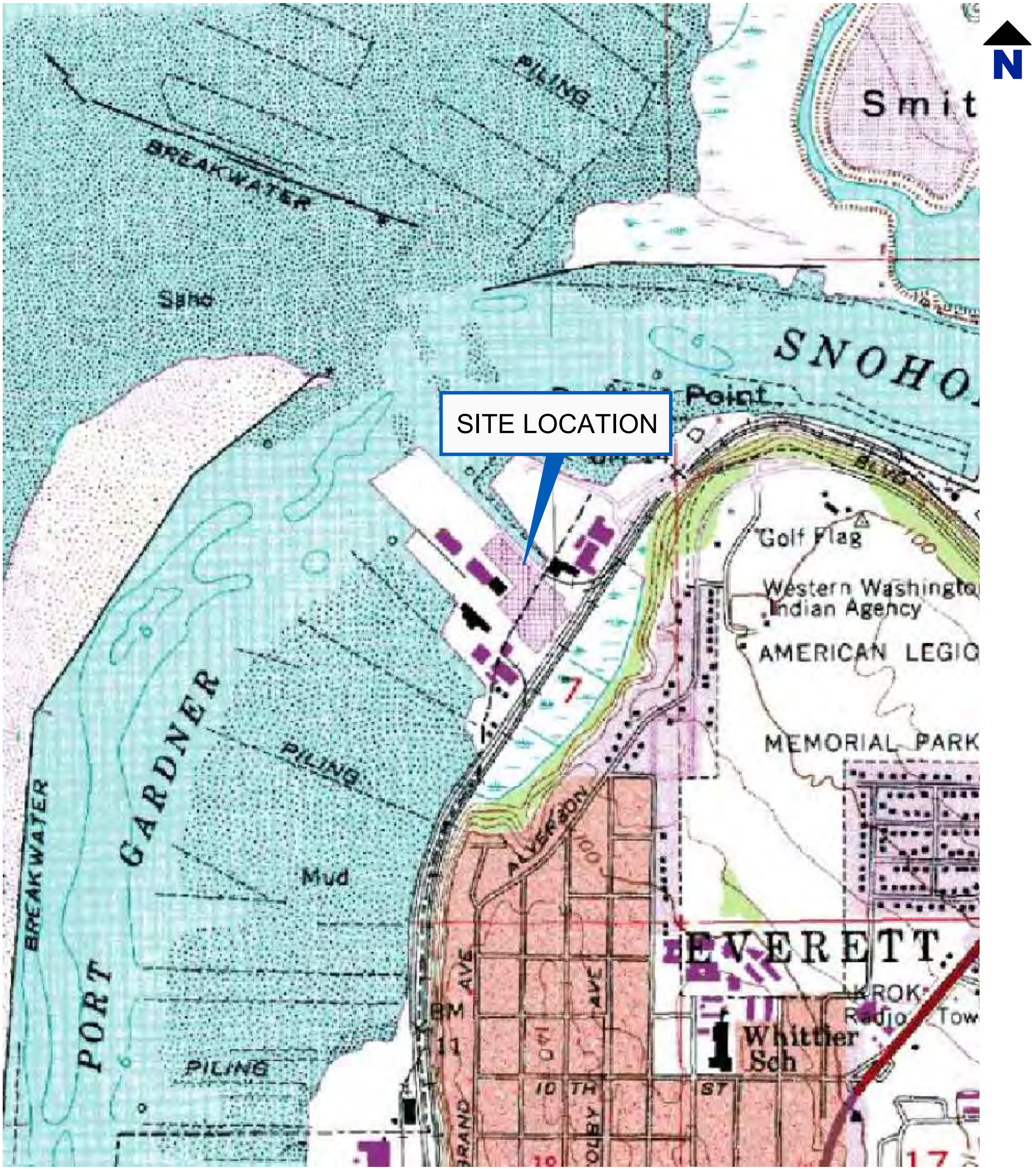
Ecology. 2015. *Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) Using the Toxicity Equivalency Factors (TEFs)*; Implementation Memorandum No. 10. April.

FIGURES



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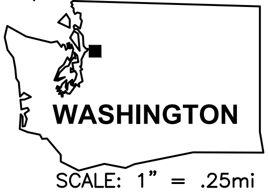

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SLR

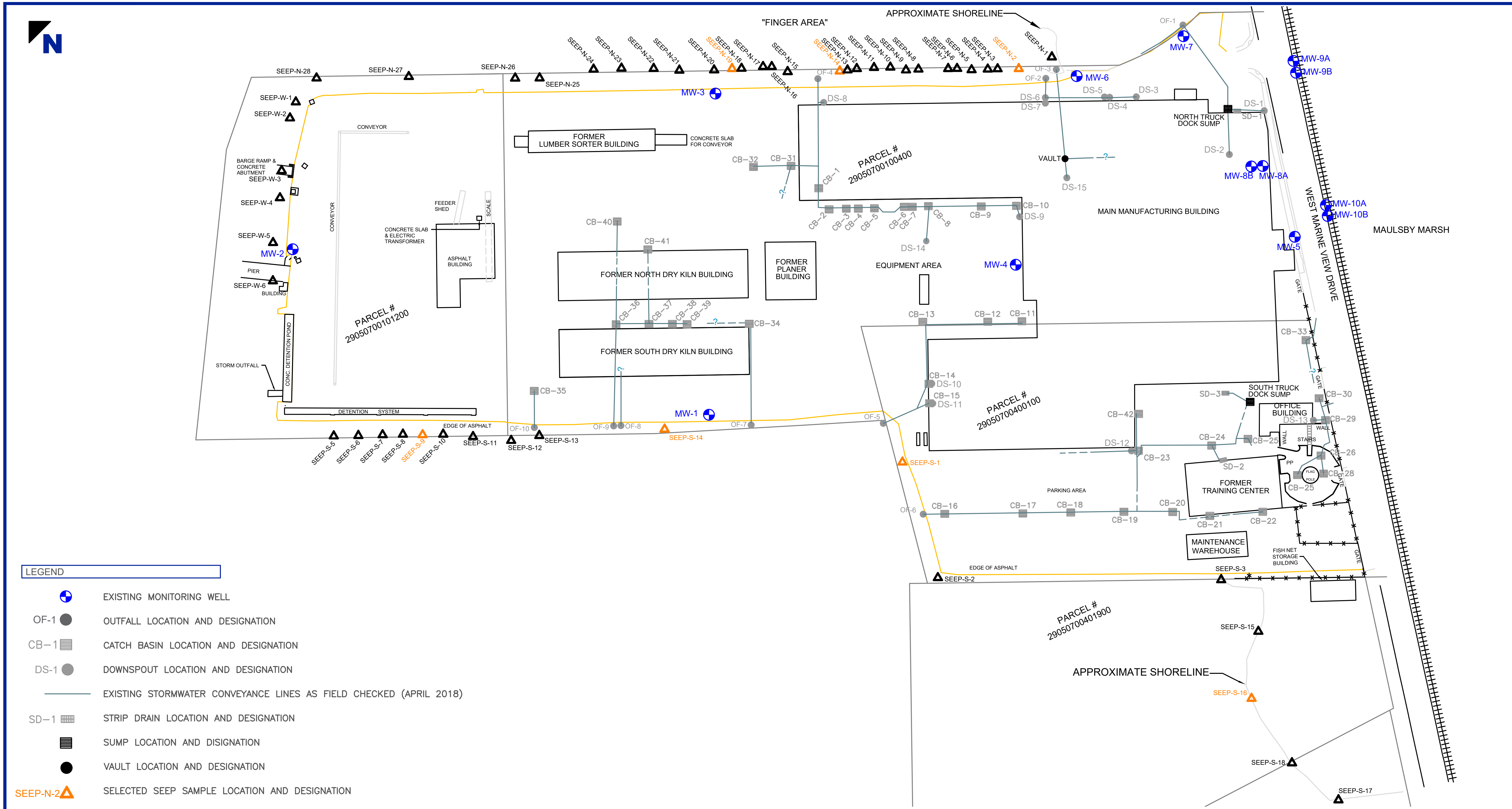
FORMER E.A. NORD
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
SUMMARY OF SCE TO ASSESS DATA GAPS
FOR COMPLETION OF RI/FR

Drawing
SITE LOCATION MAP

Date December 17, 2018	Scale AS SHOWN	Fig. No. 1
File Name Figure 1	Project No. 108.00228.00048	

Last Saved: December 17, 2018 8:24:38 PM by rvrachimi Drawing path: \\us.slr.local\us-dfs$\Portland\Projects\JELD-WEN\JELD-WEN NORD DOOR\2017_SCE\SCE Summary Report\FIGURES\RV\Figure 1.dwg



LEGEND

●	EXISTING MONITORING WELL
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB–1 ▨	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
—	EXISTING STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
SD–1 ▦	STRIP DRAIN LOCATION AND DESIGNATION
▤	SUMP LOCATION AND DISIGNATION
●	VAULT LOCATION AND DESIGNATION
SEEP-N-2 △	SELECTED SEEP SAMPLE LOCATION AND DESIGNATION
SEEP-N-6 △	SEEP SURVEY LOCATION AND DESIGNATION

0 175 350 525'

SLR

FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report SUMMARY OF SCE TO ASSESS DATA GAPS FOR COMPLETION OF RI/FS

Drawing SEEP SAMPLING LOCATIONS

Date December 17, 2018	Scale AS SHOWN	Fig. No. 2
File Name Figure 2.dwg	Project No. 108.00228.00048	

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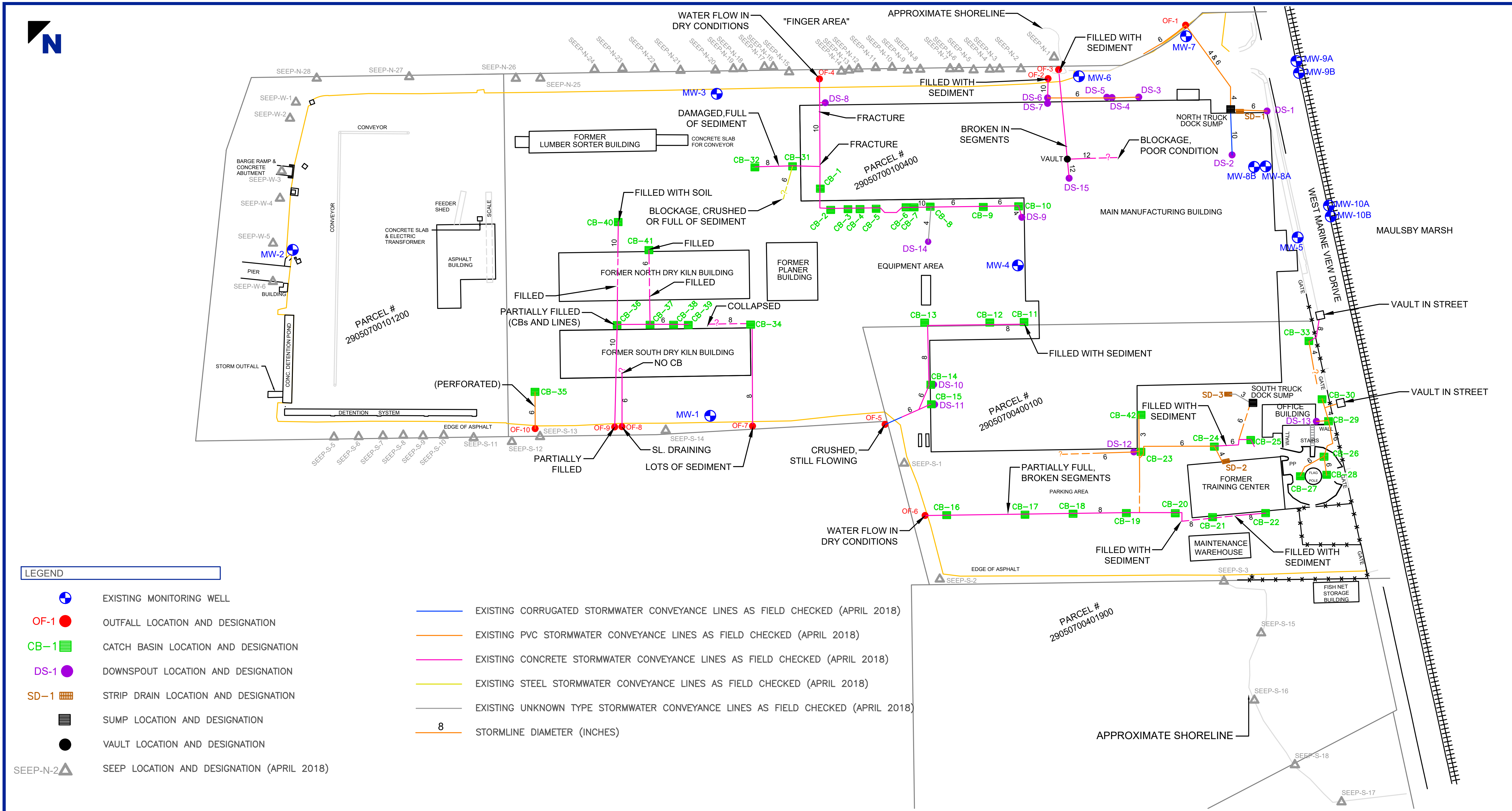


LEGEND

●	EXISTING MONITORING WELL
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB-1 🟩	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
SD-1 ▨	STRIP DRAIN LOCATION AND DESIGNATION
▤	SUMP LOCATION AND DESIGNATION
●	VAULT LOCATION AND DESIGNATION
SEEP-N-2 △	SEEP LOCATION AND DESIGNATION (APRIL 2018)

—	EXISTING CORRUGATED STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
—	EXISTING PVC STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
—	EXISTING CONCRETE STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
—	EXISTING STEEL STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
—	EXISTING UNKNOWN TYPE STORMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
8	STORMLINE DIAMETER (INCHES)

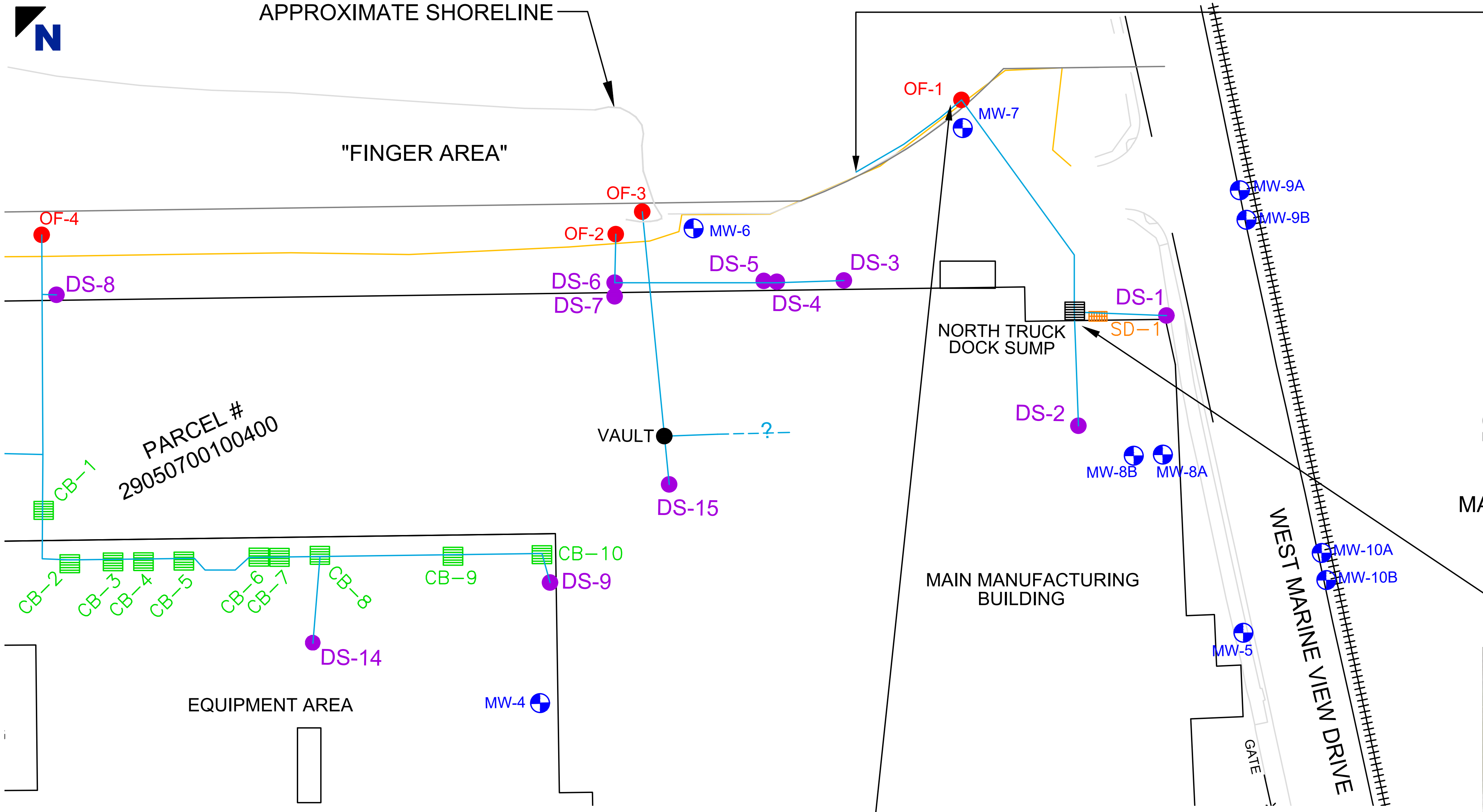
SLR

FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report SUMMARY OF SCE TO ASSESS DATA GAPS FOR COMPLETION OF RI/FS

Drawing STORMWATER SYSTEM TRACING OBSERVATIONS

Date December 14, 2018	Scale AS SHOWN	Fig. No. 3	
File Name Figure 3	Project No. 108.00228.00048		



(COMPOSITE SAMPLE LOCATION
NTD–SED–B)

PHOTO OF END OF OUTFALL PIPE

PHOTO OF THE NORTH TRUCK BAY SUMP

PHOTO OF OUTFALL–1
(COMPOSITE SAMPLE LOCATION
NTD–SED–A)

LEGEND

⊕	EXISTING MONITORING WELL
OF-1 ●	OUTFALL LOCATION AND DESIGNATION
CB–1 ▦	CATCH BASIN LOCATION AND DESIGNATION
DS-1 ●	DOWNSPOUT LOCATION AND DESIGNATION
—	EXISTING SOTRMWATER CONVEYANCE LINES AS FIELD CHECKED (APRIL 2018)
SD–1 ▦	STRIP DRAIN LOCATION AND DESIGNATION
▦	SUMP LOCATION AND DISIGNATION
●	VAULT LOCATION AND DESIGNATION

0 100 200 300'

FORMER E.A. NORD SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report SUMMARY OF SCE TO ASSESS DATA GAPS FOR COMPLETION OF RI/FS

Drawing NORTH TRUCK DOCK INVESTIGATION AREA

Date December 17, 2018
Scale AS SHOWN
Fig. No. 4
File Name SW_SITE PLAN_NORD
Project No. 108.00228.00048

SLR

Last Saved: December 17, 2018 9:27:30 PM by rvrachimi Drawing path: \\us.slr.local\us-dfs$\Portland\Projects\JELD-WEN\JELD-WEN NORD DOOR\2017_SCE\SCE Summary Report\FIGURES\RV\CAD Files\Figure 4.dwg

TABLES

Table 1
Groundwater Seep Survey Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord
Everett, WA

Location	Date	Time (2400)	Tidal Stage	Marysville Tide (ft)	Temp (C)	Cond. (ms/cm)	TDS (g/L)	DO (mg/L)	pH	ORP	NOTES
Northern Shoreline											
seep-N-1	4/17/2018	1055	Outgoing	2.1	10.0	0.31	0.2	12.8	6.16	195	
seep-N-1	4/17/2018	1325	Incoming	-0.5	9.6	0.17	--	4.9	6.94	205	
seep-N-1	4/19/2018	1430	Outgoing	-1.4	--	--	--	--	--	--	Good flow. Steep grade. Port property.
seep-N-2	4/17/2018	1114	Outgoing	1.5	9.2	5.78	3.8	18.3	6.54	208	
seep-N-2	4/17/2018	1328	Incoming	-0.5	9.1	4.34	--	4.7	6.67	241	
seep-N-2	4/19/2018	--	--	--	--	--	--	--	--	--	Fair seep to sample. Medium flow. Shallow grade.
seep-N-3	4/17/2018	1115	Incoming	1.4	9.5	5.69	4.0	10.7	6.82	163	
seep-N-3	4/17/2018	1330	Outgoing	-0.5	9.3	3.89	--	7.7	6.97	162	Very low flow, likely not a seep.
seep-N-3	4/19/2018	1435	Outgoing	-1.4	--	--	--	--	--	--	Poor to sample. Nearly dry. Shallow grade.
seep-N-4	4/17/2018	1126	Outgoing	1.1	9.7	7.76	5.0	11.0	6.83	143	
seep-N-4	4/17/2018	1332	Incoming	-0.5	10.0	5.34	--	6.4	6.99	122	Really low flow
seep-N-4	4/19/2018	1436	Outgoing	-1.4	--	--	--	--	--	--	Poor to sample. Nearly dry. Shallow grade.
seep-N-5	4/17/2018	1130	Outgoing	1.0	--	--	--	--	--	--	Submerged, not sampled
seep-N-5	4/17/2018	1334	Incoming	-0.5	--	--	--	--	--	--	Submerged, not sampled
seep-N-5	4/19/2018	1439	Incoming	-1.4	--	--	--	--	--	--	No access.
seep-N-6	4/17/2018	1137	Outgoing	0.8	9.3	6.56	4.3	5.7	6.93	-69	
seep-N-6	4/17/2018	1336	Incoming	-0.4	9.8	4.35	--	1.6	6.93	41	
seep-N-6	4/19/2018	1442	Incoming	-1.4	--	--	--	--	--	--	Fair to good flow to sample. Poor access (behind seawall)
seep-N-7	4/17/2018	1137	Outgoing	0.8	9.6	7.20	4.7	4.1	6.81	-20	
seep-N-7	4/17/2018	1337	Incoming	-0.4	--	--	--	--	--	--	No longer flowing (not a seep)
seep-N-7	4/19/2018	1445	Incoming	-1.4	--	--	--	--	--	--	Dry at lowest of tide
seep-N-8	4/17/2018	1149	Outgoing	0.5	9.0	4.31	2.8	8.7	7.12	31	
seep-N-8	4/17/2018	1338	Incoming	-0.4	9.4	2.96	--	1.7	7.11	67	
seep-N-8	4/19/2018	1510	Incoming	-1.2	--	--	--	--	--	--	Fair to sample. Medium flow. Shallow grade.
seep-N-9	4/17/2018	1156	Outgoing	0.3	9.2	7.29	4.7	5.3	7.07	-4	
seep-N-9	4/17/2018	1340	Incoming	-0.4	9.9	4.91	--	1.7	7.09	26	
seep-N-9	4/19/2018	1512	Incoming	-1.2	--	--	--	--	--	--	Fair to sample. Medium flow. Shallow grade.
seep-N-10	4/17/2018	1200	Outgoing	0.2	9.9	6.20	7.0	7.2	7.15	13	
seep-N-10	4/17/2018	1200	Outgoing	0.2	9.3	6.19	4.0	6.7	7.15	14	
seep-N-10	4/17/2018	1342	Incoming	-0.4	9.9	3.91	--	3.6	7.22	75	Good flow.
seep-N-10	4/19/2018	1514	Incoming	-1.2	--	--	--	--	--	--	Fair to sample. Medium flow. Shallow grade.
seep-N-11	4/17/2018	1208	Outgoing	0.0	10.2	8.67	5.6	4.1	7.30	-37	
seep-N-11	4/17/2018	1345	Incoming	-0.3	10.0	5.50	--	1.3	7.29	10	Medium flow.
seep-N-11	4/19/2018	1516	Incoming	-1.1	--	--	--	--	--	--	Low quality to sample. Med to low flow. Shallow grade.
seep-N-12	4/17/2018	1210	Outgoing	0.0	10.1	6.49	4.2	3.6	7.39	-69	
seep-N-12	4/17/2018	1346	Incoming	-0.3	10.1	4.46	--	2.7	7.45	7	
seep-N-12	4/19/2018	1520	Incoming	-1.1	--	--	--	--	--	--	Low quality to sample. Med to low flow. Shallow grade.
seep-N-13	4/17/2018	1219	Outgoing	-0.1	9.9	5.09	3.3	4.8	7.32	-35	
seep-N-13	4/17/2018	1347	Incoming	-0.3	10.2	3.47	--	2.4	7.44	44	
seep-N-13	4/19/2018	1520	Incoming	-1.1	--	--	--	--	--	--	Low quality to sample. Med to low flow. Shallow grade.
seep-N-14	4/17/2018	1220	Outgoing	-0.1	10.1	7.27	4.7	5.5	7.53	-84	
seep-N-14	4/17/2018	1351	Incoming	-0.2	9.8	5.12	--	1.6	7.59	-19	
seep-N-14	4/19/2018	1520	Incoming	-1.1	--	--	--	--	--	--	Fair to good flow to sample. Best of this area (N12-N14)
seep-N-15	4/17/2018	1230	Outgoing	-0.3	10.0	6.72	4.4	9.8	7.47	6	
seep-N-15	4/17/2018	1352	Incoming	-0.2	9.0	4.99	--	6.2	7.56	35	
seep-N-15	4/19/2018	1524	Incoming	-1.0	--	--	--	--	--	--	Low flow. Medium grade.
seep-N-16	4/17/2018	1235	Outgoing	-0.4	11.5	7.85	5.1	8.7	7.71	27	
seep-N-16	4/17/2018	1355	Incoming	-0.2	9.4	3.87	--	4.1	7.60	83	
seep-N-16	4/19/2018	1526	Incoming	-1.0	--	--	--	--	--	--	Low fow. Good gradient.
seep-N-17	4/17/2018	1238	Outgoing	-0.4	11.0	6.67	4.3	9.0	7.49	22	
seep-N-17	4/17/2018	1356	Incoming	-0.2	--	--	--	--	--	--	Just a trickle, no sample taken, probably not a seep
seep-N-17	4/19/2018	1526	Incoming	-1.0	--	--	--	--	--	--	Just a trickle, no sample taken, probably not a seep
seep-N-18	4/17/2018	1243	Outgoing	-0.4	9.3	3.87	2.5	10.9	7.55	-2.8	
seep-N-18	4/17/2018	1358	Incoming	-0.1	9.1	3.42	--	8.2	7.53	123	
seep-N-18	4/17/2018	1403	Incoming	0.0	9.3	4.86	3.2	9.0	7.56	-21	
seep-N-18	4/19/2018	1530	Incoming	-0.9	--	--	--	--	--	--	Low flow. Decent channel further into flats.
seep-N-19	4/17/2018	1245	Outgoing	-0.5	9.9	6.38	4.1	10.2	7.60	-27	
seep-N-19	4/17/2018	1359	Incoming	-0.1	9.7	3.95	--		7.60	45	
seep-N-19	4/19/2018	1530	Incoming	-0.9	--	--	--	--	--	--	Low flow. Decent channel further into flats.
seep-N-20	4/17/2018	1246	Outgoing	-0.5	9.4	6.96	4.5	9.0	7.46	-27	
seep-N-20	4/17/2018	1359	Incoming	-0.1	8.8	6.74	4.4	9.4	7.73	-19	
seep-N-20	4/17/2018	1400	Incoming	-0.1	9.1	4.54	--	7.7	7.46	71	
seep-N-20	4/19/2018	1532	Incoming	-0.8	--	--	--	--	--	--	Medium flow.
seep-N-21	4/17/2018	1256	Outgoing	-0.5	10.5	6.80	4.4	10.3	7.75	-42	
seep-N-21	4/17/2018	1407	Incoming	0.0	9.8	5.34	3.5	9.6	7.75	-32	
seep-N-21	4/19/2018	1533	Incoming	-0.8	--	--	--	--	--	--	Low flow. Shallow grade.
seep-N-22	4/17/2018	1255	Outgoing	-0.5	9.9	4.49	2.9	11.5	7.67	-24	
seep-N-22	4/17/2018	1412	Incoming	0.1	9.3	4.53	--	6.9	7.68	110	
seep-N-22	4/19/2018	1535	Incoming	-0.8	--	--	--	--	--	--	Low flow. Shallow grade.
seep-N-23	4/17/2018	1302	Outgoing	-0.6	13.2	11.7	7.6	9.4	7.99	8.8	
seep-N-23	4/17/2018	1411	Incoming	0.1	11.8	9.11	5.9	9.6	7.90	2.8	
seep-N-23	4/19/2018	1536	Incoming	-0.8	--	--	--	--	--	--	Low flow. Poor access.
seep-N-24	4/17/2018	1305	Outgoing	-0.6	11.9	13.0	8.5	9.3	7.84	15	
seep-N-24	4/17/2018	1414	Incoming	0.2	11.5	10.1	--	8.5	7.64	122	
seep-N-24	4/19/2018	1538	Incoming	-0.7	--	--	--	--	--	--	Medium flow. Poor access.
seep-N-25	4/17/2018	1325	Incoming	-0.5	12.2	10.5	6.8	10.1	8.14	30	Slow trickle.
seep-N-25	4/17/2018	1414	Incoming	0.2	11.4	9.05	5.9	10.5	8.28	3.5	
seep-N-25	4/19/2018	1540	Incoming	-0.7	--	--	--	--	--	--	Poor to fair channel to sample.
seep-N-26	4/17/2018	1329	Incoming	-0.5	12.1	10.5	6.8	10.1	7.94	31	ok flow.
seep-N-26	4/17/2018	1416	Incoming	0.2	11.5	9.99	6.5	10.2	8.04	10	
seep-N-26	4/19/2018	1542	Incoming	-0.6	--	--	--	--	--	--	Decent channel to sample from.
seep-N-27	4/17/2018	1335	Incoming	-0.5	13.1	9.93	6.5	9.8	7.97	47	Slow trickle.
seep-N-27	4/17/2018	1421	Incoming	0.4	12.8	12.8	8.3	8.8	7.76	32	
seep-N-27	4/19/2018	1543	Incoming	-0.6	--	--	--	--	--	--	Poor sample location. Very low flow. Shallow grade.

Table 1
Groundwater Seep Survey Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord
Everett, WA

Location	Date	Time (2400)	Tidal Stage	Marysville Tide (ft)	Temp (C)	Cond. (ms/cm)	TDS (g/L)	DO (mg/L)	pH	ORP	NOTES
seep-N-28	4/17/2018	1346	Incoming	-0.3	10.7	19.0	12.3	9.3	7.61	76	Very slow trickle.
seep-N-28	4/18/2018	1231	Outgoing	-0.1	11.1	17.0	11.1	8.6	7.67	143	
seep-N-28	4/19/2018	1544	Incoming	-0.6	--	--	--	--	--	--	No flow
Surface-N	4/18/2018	1040	Outgoing	4.0	9.0	0.85	0.6	11.4	8.57	84	
Southern Shoreline											
seep-S-1	4/18/2018	1045	Outgoing	3.7	9.1	0.69	0.63	11.0	9.03	157	Good Flow.
seep-S-1	4/18/2018	1336	Incoming	-1.1	9.5	0.81	0.74	9.95	7.97	193	Decreased flow from outgoing observation.
seep-S-2	4/18/2018	1057	Outgoing	3.2	9.7	1.65	1.51	9.14	8.08	180	ok flow.
seep-S-2	4/18/2018	1334	Outgoing	-1.1	--	--	--	--	--	--	No flow.
seep-S-3	4/18/2018	1115	Outgoing	2.4	9.4	1.76	1.63	7.32	7.54	189	Very slow trickle.
seep-S-3	4/18/2018	1327	Outgoing	-1.0	10.6	2.14	1.92	7.08	7.44	197	Very slow trickle.
seep-S-4	4/18/2018	1130	Outgoing	1.9	8.3	5.27	3.42	11.1	7.75	127	
seep-S-4	4/18/2018	1435	Incoming	-0.8	--	--	--	--	--	--	No flow
seep-S-5	4/18/2018	1137	Outgoing	1.6	8.3	5.80	3.77	10.5	7.66	132	
seep-S-5	4/18/2018	1429	Incoming	-0.9	9.1	7.11	6.63	8.01	7.90	157	Ok flow.
seep-S-5	4/18/2018	1450	Incoming	-0.5	9.3	10.40	6.75	9.86	7.81	123	Low flow.
seep-S-6	4/18/2018	1146	Outgoing	1.3	8.7	8.88	5.77	9.55	7.64	143	ok flow.
seep-S-6	4/18/2018	1427	Incoming	-0.9	--	--	--	--	--	--	Low flow.
seep-S-6	4/18/2018	1456	Incoming	-0.4	14.4	12.8	8.32	7.21	7.84	117	Low flow.
seep-S-7	4/18/2018	1153	Outgoing	1.0	9.0	8.72	5.67	9.84	7.72	141	ok to good flow.
seep-S-7	4/18/2018	1424	Incoming	-1.0	9.9	5.83	5.32	7.93	7.49	167	
seep-S-7	4/18/2018	1500	Incoming	-0.3	10.2	8.05	5.23	7.91	7.80	115	
seep-S-8	4/18/2018	1200	Outgoing	0.8	8.6	9.49	5.97	8.67	7.64	144	High flow.
seep-S-8	4/18/2018	1422	Incoming	-1.0	9.0	6.02	5.63	6.11	7.33	164	
seep-S-8	4/18/2018	1507	Incoming	-0.1	8.9	8.98	5.83	7.43	7.59	127	
seep-S-9	4/18/2018	1200	Outgoing	0.8	8.8	4.76	4.47	7.25	7.38	220	High flow.
seep-S-9	4/18/2018	1418	Incoming	-1.0	9.6	4.00	3.69	6.01	7.49	154	High flow.
seep-S-10	4/18/2018	1203	Outgoing	0.7	8.5	7.97	5.18	7.71	7.51	142	High flow.
seep-S-10	4/18/2018	1415	Incoming	-1.0	8.9	4.70	4.41	7.04	7.49	150	
seep-S-11	4/18/2018	1205	Outgoing	0.7	9.0	4.58	4.28	6.22	7.67	167	High flow.
seep-S-11	4/18/2018	1413	Incoming	-1.1	9.3	4.33	4.01	6.80	7.68	133	High flow.
seep-S-12	4/18/2018	1210	Outgoing	0.5	9.4	8.04	5.23	7.55	7.19	133	High flow.
seep-S-12	4/18/2018	1403	Incoming	-1.1	10.3	6.61	5.93	4.28	7.29	200	
seep-S-13	4/18/2018	1213	Outgoing	0.4	11.4	7.74	6.82	7.22	7.69	182	very low flow
seep-S-13	4/18/2018	1357	Incoming	-1.1	13.8	7.19	6.01	7.73	7.93	219	very low flow
seep-S-14	4/18/2018	1226	Outgoing	0.0	10.7	1.17	1.04	8.59	7.92	186	ok flow.
seep-S-14	4/18/2018	1350	Outgoing	-1.1	12.5	2.03	1.74	8.67	7.95	210	low flow
seep-S-15	4/19/2018	1319	Outgoing	-0.5	11.0	9.18	5.97	7.42	7.48	131	Good flow.
seep-S-15	4/19/2018	1502	Incoming	-1.3	10.9	9.10	5.92	4.61	7.59	-191	
seep-S-16	4/19/2018	1326	Outgoing	-0.6	14.6	7.39	4.80	4.67	7.85	130	Good flow.
seep-S-16	4/19/2018	1508	Incoming	-1.2	14.6	7.40	4.81	4.56	7.96	-150	
seep-S-17	4/19/2018	1336	Outgoing	-0.8	10.3	9.06	5.89	5.53	7.55	-30	Good flow.
seep-S-17	4/19/2018	1527	Incoming	-0.9	10.7	9.17	5.96	4.80	7.80	-69	
seep-S-18	4/19/2018	1345	Outgoing	-1.0	15.0	4.93	3.20	6.91	8.06	-60	Good flow.
seep-S-18	4/19/2018	1520	Incoming	-1.1	15.3	4.96	3.22	6.10	8.11	-102	
Surface-S	4/18/2018	1020	Outgoing	4.8	9.5	3.35	2.17	12.3	8.62	86	
Western Shoreline											
seep-W-1	4/18/2018	1241	Outgoing	-0.3	8.38	10.8	6.99	10.4	7.85	143	trickle. Difficult access.
seep-W-1	4/18/2018	1408	Incoming	-1.1	9.11	9.40	6.11	12.0	8.04	116	
seep-W-2	4/18/2018	1248	Outgoing	-0.5	7.79	3.95	2.57	12.0	8.02	118	ok trickle. Difficult access.
seep-W-2	4/18/2018	1413	Incoming	-1.1	7.94	3.38	2.19	11.0	8.06	105	
seep-W-3	4/18/2018	1255	Outgoing	-0.6	8.51	18.2	11.8	9.04	7.48	147	good. Difficult access.
seep-W-3	4/18/2018	1423	Incoming	-1.0	8.79	17.7	11.5	8.30	7.61	140	
seep-W-4	4/18/2018	1300	Outgoing	-0.7	8.82	16.7	10.9	8.63	7.64	143	ok/good flow. Difficult access.
seep-W-4	4/18/2018	1429	Incoming	-0.9	8.99	15.0	9.78	9.26	7.71	131	
seep-W-5	4/18/2018	1308	Outgoing	-0.8	8.62	14.8	9.64	8.55	7.82	138	ok flow. Difficult access.
seep-W-5	4/18/2018	1432	Incoming	-0.8	9.03	14.8	9.60	8.26	7.87	131	
seep-W-6	4/18/2018	1314	Outgoing	-0.9	8.96	14.1	9.19	8.62	7.79	125	good flow. Difficult access.
seep-W-6	4/19/2018	1418	Outgoing	-1.3	9.53	12.3	7.98	11.0	8.01	51	
Surface-W	4/19/2018	1420	Outgoing	-1.4	9.55	0.93	0.58	11.0	7.96	20	

Notes:

Tidal condition and elevation from station TWC1125 Marysville, Quilceda Creek
(https://tidesandcurrents.noaa.gov/stationhome.html?id=TWC1125)

Water quality parameters collected with YSI 556 and/or YSI Pro Plus

Table 2
Seep Sampling Analytical Summary Table
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord Facility
Everett, Washington

Lab Sample ID			Preliminary Cleanup Levels (PCLs)		L994838-01		L994838-02		L994838-03		L994838-04		L994838-05		L994838-06		L994838-07		L994838-08	
Field Sample ID					SEEP-N-2		SEEP-N-14		SEEP-N-18		SEEP-S-1		SEEP-S-9		SEEP-S-14		SEEP-S-16		DUPLICATE-0518	
Date Collected					05/15/2018		05/15/2018		05/15/2018		05/14/2018		05/14/2018		05/15/2018		05/14/2018		05/14/2018	
Method	Analyte	Units	Value	Source	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Volatile Organic Compounds (VOCs)																				
8260C	BENZENE	µg/L	2.4	(vi-b)	<0.0896		<0.0896		<0.0896		<0.0896		<0.0896		<0.0896		<0.0896		<0.0896	
8260C	NAPHTHALENE	µg/L	8.9	(vi-b)	<0.174	J0	<0.174	J0	<0.174	J0	<0.174	J0	<0.174	J0	<0.174	J0	<0.174	J0	<0.174	J0
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)																				
8270D-SIM	BENZO(A)ANTHRACENE	µg/L	-	-	<0.00410		<0.00410		<0.00410		<0.00410		<0.00410		<0.00410		<0.00410		<0.00410	
8270D-SIM	BENZO(A)PYRENE	µg/L	-	-	<0.0116		<0.0116		<0.0116		<0.0116		<0.0116		<0.0116		<0.0116		<0.0116	
8270D-SIM	BENZO(B)FLUORANTHENE	µg/L	-	-	<0.00212		<0.00212		**0.0025**	B J	<0.00212		**0.00429**	B J	<0.00212		**0.00415**	B J	<0.00212	
8270D-SIM	BENZO(K)FLUORANTHENE	µg/L	-	-	<0.0136		<0.0136		<0.0136		<0.0136		<0.0136		<0.0136		<0.0136		<0.0136	
8270D-SIM	CHRYSENE	µg/L	-	-	<0.0108		<0.0108		<0.0108		<0.0108		<0.0108		<0.0108		<0.0108		<0.0108	
8270D-SIM	DIBENZ(A,H)ANTHRACENE	µg/L	-	-	<0.00396		<0.00396		<0.00396		<0.00396		<0.00396		<0.00396		<0.00396		<0.00396	
8270D-SIM	INDENO(1,2,3-CD)PYRENE	µg/L	-	-	<0.0148		<0.0148		<0.0148		<0.0148		<0.0148		<0.0148		<0.0148		<0.0148	
Calc.	TEQ: ND=1/2DL	µg/L	0.015	(pql)^A	0.008		0.008		**0.008**		0.008		**0.008**		0.008		**0.008**		0.008	
Total Petroleum Hydrocarbons (TPH)																				
NWTPHDX-NO SGT	DIESEL RANGE ORGANICS	µg/L	500	(pot)	<66		<66		<66		<66		**115**	J	<66		<66		<66	
NWTPHDX-NO SGT	RESIDUAL RANGE ORGANICS	µg/L	500	(pot)	<82.5		<82.5		**470**		<82.5		**239**	J	<82.5		<82.5		<82.5	
Dioxins and Furans																				
8290A	TEQ: ND=1/2DL	pg/L	57	(pql)	**6.83**		**7.44**		**7.03**		**6.44**		-		**7.50**		**7.30**		-	
Polychlorinated Biphenyls (PCBs)																				
1668A	TEQ: ND=1/2DL	pg/L	1.31	(pql)	-		-		-		**0.573**		**0.592**		**0.542**		**1.11**		**0.142**	
1668A	Total PCBs	pg/L	7.0	(hh-cwa)	-		-		-		**460**		**72.2**		**71.8**		**16,200**		**16,200**	

Notes

Bold indicates detected above the laboratory detection limit

Gray shading indicates detected above the Preliminary Cleanup Level (PCL)

<0.0896 indicates not detected above the laboratory detection limit of 0.0896µg/L

TEQ: ND=1/2DL indicates toxic equivalent quotient (TEQ) value using a value of 1/2 the detection limit (DL) for non-detect (ND) results

Full laboratory results and Quality Assurance/Quality Control (QA/QC) results included in laboratory analytical reports (Attachment 4)

Lab Qualifiers

B: The same analyte is found in the associated blank

J: The identification of the analyte is acceptable; the reported value is an estimate.

J0: Calibration verification outside of acceptance limits. Result is estimated.

PCL Definitions:

hh-cwa:Surface Water ARAR - Human Health - Marine - Clean Water Act §304 / 40 CFR 131.45

pot: Potable Groundwater Screening Level

pql: Applicable Practical Quantitation Level (PQL) provided by laboratory. PQL calculations presented on Table 3

vi-b: Method B, Unrestricted Land Use (Protective of Vapor Intrusion)

A - PCL for cPAHs TEQ based on 8310LL Method

Table 3
PQL Calculation Tables
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord Facility
Everett, Washington

Compound	PQL	TEF	TEQ
Carcinogenic Polycyclic Aromatic Compounds (cPAHs) (ug/L)			
benzo[a]anthracene	**0.01**	0.1	**0.001**
benzo[a]pyrene	**0.01**	1	**0.01**
benzo[b]fluoranthene	**0.01**	0.1	**0.001**
benzo[k]fluoranthene	**0.01**	0.1	**0.001**
chrysene	**0.01**	0.01	**0.0001**
dibenzo[a,h]anthracene	**0.01**	0.1	**0.001**
indeno[1,2,3-cd]pyrene	**0.01**	0.1	**0.001**
Total TEQ			**0.015**
Dioxins/Furans (pg/L)			
2,3,7,8-TCDD	**5**	1	**5**
1,2,3,7,8-PeCDD	**25**	1	**25**
1,2,3,4,7,8-HxCDD	**25**	0.1	**2.5**
1,2,3,6,7,8-HxCDD	**25**	0.1	**2.5**
1,2,3,7,8,9-HxCDD	**25**	0.1	**2.5**
1,2,3,4,6,7,8-HpCDD	**25**	0.01	**0.25**
OCDD	**50**	0.0003	**0.015**
2,3,7,8-TCDF	**5**	0.1	**0.5**
1,2,3,7,8-PeCDF	**25**	0.03	**0.75**
2,3,4,7,8-PeCDF	**25**	0.3	**7.5**
1,2,3,4,7,8-HxCDF	**25**	0.1	**2.5**
1,2,3,6,7,8-HxCDF	**25**	0.1	**2.5**
1,2,3,7,8,9-HxCDF	**25**	0.1	**2.5**
2,3,4,6,7,8-HxCDF	**25**	0.1	**2.5**
1,2,3,4,6,7,8-HpCDF	**25**	0.01	**0.25**
1,2,3,4,7,8,9-HpCDF	**25**	0.01	**0.25**
OCDF	**50**	0.0003	**0.015**
Total TEQ			**57.0**
PCB Congeners (pg/L)			
77	**10**	0.0001	**0.001**
81	**10**	0.0003	**0.003**
105	**10**	0.00003	**0.0003**
114	**10**	0.00003	**0.0003**
118	**10**	0.00003	**0.0003**
123	**10**	0.00003	**0.0003**
126	**10**	0.1	**1**
156	**20**	0.00003	**0.0006**
157	**10**	0.00003	**0.0003**
167	**10**	0.00003	**0.0003**
169	**10**	0.03	**0.3**
189	**10**	0.00003	**0.0003**
Total TEQ			**1.31**

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
Out Fall 1					
DS-2 to North Truck Bay Sump	Corrugated Plastic	10	Good	Clean	The downspout drains the roof through the interior of the building.
DS-1 to SD-1	White PVC	6	Good	Clean	The downspout drains the roof from the exterior of the building and the storm line is at a relatively steep gradient. The storm line is a relatively short run of pipe.
Strip drain to North Truck Bay Sump	Corrugated Plastic	4	Good	Clean	The storm line is an extremely short run.
North Truck Bay Sump to OF-1	Black PVC & White PVC	4 & 6	Good	Clean	The first segment of piping is above ground in a black 4" PVC pipe before making several 45 degree elbows. The second segment is a below ground white 6" PVC pipe which was observed to be backfilled with water. The high flow from the sump pump keeps pipe relatively clear of large debris.
OF-1	White PVC	6	Broken	Mostly clean	A broken 90 degree elbow use to tie the main 6" PVC line from the sump to another 6" PVC line which parallels concrete wall on north side of property. The broken segment of line is mostly above ground, although, some is buried very shallow. The line terminates above ground and the last one foot is broken. The storm line collects standing water.
Out Fall 2					
DS-3 to DS-4	White PVC	6	Good	Mostly clean	Straight run of pipe. The downspout drains the roof on the exterior of the building. The downspout is broken but the in-ground drain still exists.
DS-4 to DS-5	White PVC	6	Good	Clean	Very short run of below ground piping which each drain two adjacent downspouts, on the exterior of the building.
DS-5 to DS-6	White PVC	6	Good	Clean	Straight run of pipe. The downspouts drain the roof on the exterior of the building.
DS-7 to OF-2	Concrete	Approx. 10	Fair	Dirty, filled with sediment near outfall	Straight run of pipe. The downspout drains the roof on the interior of the building which leads to a concrete vault. The drain line was filled with water and therefore we received poor video quality. However, slight offsets in joints were visible in the footage.
DS-6	White PVC	6	Good	Clean	DS-6 ties directly into a small in-ground drain which is directly above the approximately 10-inch diameter concrete pipe from DS-7 to OF-2.
Out Fall 3					
DS-15 to Vault	Concrete	12	Fair	Mostly clean	The concrete pipe appears to be in segments of 4 foot lengths. Slight separation between joints was observed.
Vault to unknown location	Concrete	12	Poor	Bad	Northeast trending line away from the interior concrete vault. The storm line was very dirty therefore there was no visibility with the camera. A blockage in line was observed approximately 60 feet from the vault.

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
Vault to OF-3	Concrete	12	Poor	Fair to bad	Concrete pipe appears to be in 4 foot segments. Some joint separation (up to ~2") was observed as well as some loose soil infiltrating the line. The storm line was mostly full of water and sediment near outfall.
Out Fall 4					
DS-9 to CB-10	Concrete	4	Poor	Fair	The storm line appears to terminate approximately 2 feet before reaching downspout. Based on location and direction, it appears that the storm line may have formerly connected to the downspout.
CB-10 to CB-9	Concrete	6	Fair	Fair	The catch basins are in poor condition. No water was observed in the line. The line was observed to have some sediment.
CB-9 to CB-8	Concrete	6	Fair	Fair	The catch basins are in poor condition. No water was observed in the line. The line was observed to have some sediment.
DS-14 to CB-8	White PVC	4	Good	Good	The downspout drains the roof on the exterior of the building. Appears in good condition but did not confirm with video due to poor access point.
CB-8 to CB-7	Concrete	10	Fair	Fair	The catch basins are in poor condition. No water was observed in the line. The line was observed to have significant sediment.
CB-7 to CB-6	Concrete	10	Fair	Fair	The catch basins are in fair condition. No water was observed in the line. The line was observed to have significant sediment.
CB-6 to CB-5	Concrete	10	Fair	Fair	The catch basins are in fair condition. No water was observed in the line. The line was observed to have significant sediment. The lines appear to make a jog away from the building due to the conveyor belt pit.
CB-5 to CB-4 to CB-3 to CB-2	Concrete	10	Fair	Fair	The catch basins are in fair condition. No water was observed in the line. The line was observed to have significant sediment, worse near CB-5.
CB-2 to CB-1	Concrete	10	Fair	Fair	The catch basins are in fair condition. The storm line makes 90 degree bend in line run. The line is partially filled with sediment but appears to drain water.
CB-1 to OF-4	Concrete	10	Fair	Fair	Straight run of pipe. The concrete pipe appears in fair condition. Significant water flows out of OF-4, regardless of weather, was observed. There appeared to be a significant fracture in line between the T with CB-31 and with the T with DS-8 that allows water to infiltrate into the storm line. Water was observed flowing in line from this point to the outfall, no evidence of fracture or separated joint visible on the video. After sending camera unit up line and disturbing the sediment, a sheen was noticed leaving the outfall.
CB-32 to CB-31	Concrete	~8	Poor	Poor	Straight run of pipe. The pipe is very damaged at CB-31, and is nearly completely crushed. CB-32 appears to have been removed and the cavity was observed to be filled with sediment. Based on effort taken to push the rod, the line is very full with sediment and possibly crushed or filled with sediment near CB-32.

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
CB-31 to unknown	Steel	6	Poor	Poor	The line is either collapsed or filled with sediment. We were unsuccessful in sending rod up the line. We then attempted to locate the steel line a as metallic utility which was also unseccessful. Unknown length, conditions or terminating point.
CB-31 to OF-4	Concrete	10 to 12	Poor	Fair	The line is very damaged in CB-31, and is partially crushed. The line appears in decent condition from CB-31 to the T joining CB-1 and OF-4. No water in line was observed in the line at the time of our work, however, it appears that this storm line would drain water.
DS-8 to OF-4	PVC	6	Good	Good	DS-8 ties into the top of the concrete line draining into OF-4.
Out Fall 5					
CB-11 to CB-12	Concrete	8	Fair	Poor	The catch basins and storm lines are filled with sediment and sticks. We were unsuccessful in sending the camera down lines.
CB-12 to CB-13	Concrete	8	Fair	Mostly clean	The storm line appears clear of debris although there was sediment in catch basins. The storm line was dry at the time of our work.
CB-13 to CB-14	Concrete	8	Fair to good	Mostly clean	The storm line appears to drain water. A catch basin was observed midway between these points on the video; however, the catch basin was under a concrete footing. The concrete footing was likely added after as a footing for the overhead conveyor. The storm line was observed to be in fair to good condition with some sediment.
DS-10 to CB-14	White PVC	6	Good	Good	The downspout terminates directly over catch basin.
CB-14 to OF-5	Concrete	8	Good	Mostly clean	The storm line makes two 45 degree bends and ties into storm line leading from CB-15 to OF-5. This segment of pipe appears in good operating condition. The outfall appears to drain into a black corrugated plastic pipe, which drains surface water from the parking lot. The corrugated pipe dives below a dirt berm and into the gravel shoreline, where it was observed to be buried and crushed; although water was observed to still flow.
DS-11 to CB-15	White PVC	6	Good	Good	The downspout terminates directly over catch basin.
CB-15 to OF-5	Concrete	8	Good	Mostly clean	See notes for CB-14 to OF-5
Out Fall 6					
SD-3 to South Truck Bay Sump	Unknown	unknown	unknown	unknown	This strip drain likely drains into truck bay sump, which then gets pumped via a submersible pump. The pump was not working at the time of our field work and therefore we could not access the drain line.
South Truck Bay Sump to CB-24	White PVC	6 & ~3	Good	Mostly clean	It appears that the sump pump pumps into a 3" PVC pipe which discharges into a 6" PVC near the corner of the truck dock and near the several 45 degree bends adjacent to the Y-connection with the concrete line from CB-25.

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
CB-25 to CB-24	Concrete	6	Fair	Poor	The storm line was observed to be very filled with sediment. The line appeared to tie into the PVC line from the Truck Sump to CB-24.
SD-2 to CB-24	White PVC	4	Good	Good	The strip drain and storm line appears to have been installed or serviced recently, based on cut and patch in asphalt. Both appeared in good condition.
CB-24 to CB-19	White PVC	6	Good	Good	The storm line was observed to be full of water. The line made a largely straight run with several 45 degree bends downline of CB-23. The storm line T's into the main run of lines continuing on towards the outfall, just upstream of CB-19.
CB-42 to CB-23	White PVC	3	Good	Good	The storm line appears to drain water. The line runs a straight line and ties into an upper portion of CB-23. The line runs under a lean to style building.
DS-12 to CB-23	White PVC	6	Good	Good	The downspout terminates directly over the catch basin.
Unknown to CB-23	White PVC	6	Good	Good	An unknown line trends southwest, parallel to the building. The line appears to support several small garden style drains in grass area adjacent to building.
CB-22 to CB-21	Concrete	8	Fair	Poor	The line was observed to be very full of sediment therefore we were unsuccessful in sending the camera or rod the full length.
CB-21 to CB-20	Concrete	8	Fair	Fair	The line was observed to be full of sediment. Two 90 degree elbows connect CB-21 to CB-20. We were unsuccessful in bending the rod around both elbows. Some standing water was observed in line.
CB-20 to CB-19	Concrete	8	Good to Fair	Fair	The storm line was observed to be full of water. A T-joint ties in the PVC line from CB-24 to the main concrete line.
CB-19 through OF-6	Concrete	8	Good to Fair	Fair	The storm line was observed to be full of water and partially filled with sediment. The concrete pipe appears to be built with 4-foot segments of concrete pipe. Most of the joints were observed to be tight; however, some joints were slightly offset up to approximately 0.5 inches. Very slight water flows from outfall regardless of weather.

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
Out Fall 7					
Unknown to CB-34	Concrete	8	Poor	Poor	A northwest trending line from CB-34 has an unknown destination. The line may be collapsed before it reaches another catch basin or filled with sediment. Another catch basin in the vicinity was not found at the time of field work.
CB-34 to OF-7	Concrete	8	Fair to Poor	Fair	Some sediment was observed within the line. Lots of sediment was observed near the outfall.
Out Fall 8					
OF-8	Concrete	6	Poor	Poor	Poor quality outfall. Very slight water draining while raining and no evidence of a catch basin was observed at the time of our field work.
Out Fall 9					
CB-40 to CB-36	Concrete	10	Poor	Poor	CB-40 is a poor quality catch basin which is elevated and filled with sediment. The storm line is also filled with sediment. Based on the tracing, there appears to be a blockage between the two catch basins.
CB-41 to CB-37	Concrete	6	Poor	Poor	CB-41 is filled with sediment. The storm line is also filled with sediment. Based on the tracing, there appears to be a blockage between the two catch basins.
CB-39 through CB-36	Concrete	6	Fair to poor	Poor	All of the catch basins are partially filled with sediment. The storm lines have significant sediment in them as well. None of the catch basins appear to drain significant water.
CB-36 to OF-9	Concrete	10	Fair to Poor	Poor	The catch basin was partially filled with sediment at the time of our field work. The storm line has sediment in it too, especially near the outfall.
Out Fall 10					
CB-35 to OF 10	White Perforated PVC	6	Good	Good	The catch basin appears to drain well. The outfall extends beyond asphalt parking pad.
Street Discharge 1					
CB-27 & CB-28 to CB-26	White PVC	6	Good	Good	The catch basins and lines were completely filled with water at the time of our field work. The catch basins in asphalt parking lot were in very good condition.
CB-26 to street discharge	White PVC	6	Good	Good	The storm line was partially filled with water and minor sediment at the time of our field work. The storm line makes several bends around landscaping features.
DS-13 to CB-29	White PVC	4	Good	Good	The storm line appears to be a mostly clean PVC line which discharges into CB-29. CB-29 has an open bottom which drops into the 6" Line. The discharge point was traced into a vault in the street.
CB-30 to street discharge	White PVC	6	Good	Good	Minor sediment was observed in the storm lines at the time of our field work. The storm line makes a T with line from CB-26, which then discharges into street catch basin.
Street Discharge 2					

Table 4
Stormwater System Tracing Observations
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Nord Door - JELD-WEN
Everett, Washington

Line Run	Pipe Material	Pipe Diameter (Inches)	Condition	Cleanliness	Notes
CB-33 to unknown	White PVC	4	Good	Fair	Some sediment was observed within storm line. The line parallels the chain-link fence until it terminates at the gate. The line does not appear to support any other catch basins.
CB-33 to street discharge	Concrete	8	Good	Good to fair	Partial sediment was observed in the line at the time of our site visit. The line makes several 45 degree joints under the sidewalk and appears to drain water into a vault in the street.

Table 5
North Truck Dock Sump Water Analytical Results
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord Door Facility
Everett, WA

Lab Sample ID			**Preliminary Cleanup Levels (PCLs)**		L983742-01		L983742-02		L983742-03		L983742-04	
Field Sample ID					NTD-SW-EAST-0418		NTD-SW-WEST-0418		NTD-SW-3"-0418		NTD-SW-8"-0418	
Date Collected					04/05/2018		04/05/2018		04/04/2018		04/04/2018	
Method	Analyte	Units	Value	Source	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water Quality Parameters												
Field Measurement	Temperature	°C	-		8.33		8.45		7.28		8.35	
Field Measurement	Conductivity	mS/cm	-		0.458		0.325		0.183		0.016	
Field Measurement	Total Dissolved Solids (TDS)	g/L	-		0.294		0.211		0.119		0.011	
Field Measurement	Dissolved Oxygen (DO)	mg/L	-		5.20		4.40		6.33		7.09	
Field Measurement	pH	Units	-		5.69		6.22		6.89		6.37	
Field Measurement	Oxidation Reduction Potential (ORP)	mV	-		107.6		39.2		13.7		88.6	
Volatile Organic Compounds (VOCs)												
8260C	BENZENE	µg/L	0.8	mB	<0.5		<0.5		<0.5		<0.5	
8260C	NAPHTHALENE	µg/L	160	mA	**5.94**		**0.558**	J	**3.45**		**0.25**	J
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)												
8270D-SIM	BENZO(A)ANTHRACENE	µg/L	-		<0.00410		<0.00410		<0.00410		<0.00410	
8270D-SIM	BENZO(A)PYRENE	µg/L	-		<0.0116		<0.0116		<0.0116		<0.0116	
8270D-SIM	BENZO(B)FLUORANTHENE	µg/L	-		<0.00212		<0.00212		<0.00212		<0.00212	
8270D-SIM	BENZO(K)FLUORANTHENE	µg/L	-		<0.0136		<0.0136		<0.0136		<0.0136	
8270D-SIM	CHRYSENE	µg/L	-		<0.0108		<0.0108		<0.0108		<0.0108	
8270D-SIM	DIBENZ(A,H)ANTHRACENE	µg/L	-		<0.00396		<0.00396		<0.00396		<0.00396	
8270D-SIM	INDENO(1,2,3-CD)PYRENE	µg/L	-		<0.0148		<0.0148		<0.0148		<0.0148	
Calc.	TEQ: ND=1/2DL	µg/L	0.015	pql ^{A}	ND		ND		ND		ND	
Total Petroleum Hydrocarbons (TPH)												
NWTPHDX-NO SGT	DIESEL RANGE ORGANICS	µg/L	500	pot	**534**		**776**		**218**		**316**	
NWTPHDX-NO SGT	RESIDUAL RANGE ORGANICS	µg/L	500	pot	**266**		**550**		**374**		**362**	
Dioxins/Furans												
8290A	TEQ: ND=1/2DL	pg/L	57	pql	**2.63**		**2.28**		**2.32**		**2.01**	
Polychlorinated Biphenyls (PCB) Congeners												
1668A	TEQ: ND=1/2DL	pg/L	1.3	pql	**0.102**		**0.0866**		**0.121**		**0.122**	
1668A	TOTAL PCBs	pg/L	7.0	hh-cwa	**653**		**562**		**80**		**344**	

Notes

Bold indicates detected above the laboratory detection limit

Green shading indicates detected above the Revised PCL

<0.05 indicates not detected above the laboratory reporting limit of 0.05 ug/L

TEQ: ND=DL/2 indicates toxic equivalent quotient (TEQ) value using a value of 1/2 the detection limit (DL) for non-detect (ND) results

Full laboratory results and Quality Assurance/Quality Control (QA/QC) results included in laboratory analytical reports (Attachment 4)

A - PCL for cPAHs is from SCE Work Plan using PQLs for 8310LL method

Lab Qualifiers

J: The identification of the analyte is acceptable; the reported value is an estimate.

Table 6
NTD Sump Solids and Discharge Point Soil Analytical Results
Summary of SCE to Assess Data Gaps for Completion of RI/FS
Former E.A. Nord Door Facility
Everett, WA

					CB Sump Solids		Port of Everett Soil Samples			
Lab Sample ID			Preliminary Cleanup Levels (PCLs)		L983744-01		L1009317-01		L1009317-02	
Field Sample ID					NTD-SED-0418		NTD-SED-A		NTD-SED-B	
Date Collected					04/04/2018		7/9/2018		7/9/2018	
Method	Analyte	Units	**Value**	**Source**	Result	Qual	Result	Qual	Result	Qual
Conventional Parameters										
2540 G-2011	TOTAL SOLIDS	%	-		**55.1**		**89.1**		**84.5**	
160.4/2540G	TOTAL VOLATILE SOLIDS	% of TS	-		-		**10.1**		**11.4**	
350.1	AMMONIA NITROGEN	mg/kg	-		-		<1.76		<1.86	
USDA LOI	TOTAL ORGANIC CARBON	mg/kg	-		-		**32,800**		**50,200**	
ASTM D 422	GRAVEL	%	-		-		**47**		**16**	
ASTM D 422	SAND	%	-		-		**37**		**33**	
ASTM D 422	SILT	%	-		-		**13**		**48**	
ASTM D 422	CLAY	%	-		-		**3**		**3**	
Volatile Organic Compounds (VOCs)										
8260C	BENZENE	mg/kg	0.002	gwl-s	**0.000762**	J	**0.000713**	J	**0.00137**	
8260C	NAPHTHALENE	mg/kg	0.24	gwl-s	**0.0237**		**0.0691**		**0.0178**	
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)										
8270D-SIM	BENZO(A)ANTHRACENE	mg/kg	-		**0.0567**		**0.29**		**0.117**	J
8270D-SIM	BENZO(A)PYRENE	mg/kg	-		**0.0516**		**0.235**		**0.141**	J
8270D-SIM	BENZO(B)FLUORANTHENE	mg/kg	-		**0.0677**		**0.312**		**0.251**	
8270D-SIM	BENZO(K)FLUORANTHENE	mg/kg	-		**0.02**		**0.076**	J	**0.0685**	J
8270D-SIM	CHRYSENE	mg/kg	-		**0.108**		**0.439**		**0.147**	
8270D-SIM	DIBENZ(A,H)ANTHRACENE	mg/kg	-		**0.0133**		<0.0135		**0.0515**	J
8270D-SIM	INDENO(1,2,3-CD)PYRENE	mg/kg	-		**0.0285**		**0.143**		**0.14**	J
TOTAL TEQ	Total TEQ	mg/kg	0.12	gwl-s	**0.071**		**0.322**		**0.205**	
Total Petroleum Hydrocarbons (TPH)										
NWTPHDX-NO SGT	DIESEL RANGE ORGANICS	mg/kg	2,000	mA	<363		**234**		**452**	
NWTPHDX-NO SGT	RESIDUAL RANGE ORGANICS	mg/kg	2,000	mA	**931**		**1,530**		**2,350 ***	
Dioxins/Furans										
8290A	TEQ: ND=DL/2	pg/g	5.2	Back[1]	**102**		**98.4**		**170**	
Polychlorinated Biphenyls (PCB) Congeners										
1668A	TOTAL PCBs	pg/g	3,500	Back[2]	**50,600**		**29,600**		**30,100**	
1668A	TEQ: ND=DL/2	pg/g	2.0	TEE	**6.2**		**1.2**		**0.96**	

Notes

Bold indicates detected above the laboratory reporting limit

Green shading indicates detected above the Revised PCL

<363 indicates not detected above the laboratory reporting limit of 363 mg/kg

TEQ: ND=DL/2 indicates toxic equivalent quotient value using a value of 1/2 the detection limit for non-detect values

Lab Qualifiers

J: The identification of the analyte is acceptable; the reported value is an estimate.

*: Most closely resembles Motor Oil

PCL Definitions:

gwl-s: Protective of leaching to groundwater, saturated soil

mA: Method A, Unrestricted Land Use

Back[1]: Natural background concentration - soil (Ecology, 2010)

Back[2]: Natural background concentration - marine sediment (Ecology, 2017)

TEE: Terrestrial Ecological Evaluation - Soil

ATTACHMENT 1

SURVEY OF GROUNDWATER SEEP LOCATIONS

NORD DOOR SITE, EVERETT
SEEP ELEVATIONS AND COORDINATES
5/20/2018

SEEP ID	Northing	Easting	Ground Elevation
SN1	10112.9	8939.8	6.5
SN2	10167.9	8870.9	3.2
SN3	10206.2	8835.3	1.7
SN4	10212.9	8826.5	1.3
SN5	10240.3	8808.5	-0.4
SN6	10261.1	8785.5	0.0
SN7	10267.0	8776.9	0.9
SN8	10312.5	8728.6	0.1
SN9	10324.7	8713.0	0.1
SN10	10348.9	8688.2	0.1
SN11	10370.7	8667.3	0.2
SN12	10388.7	8650.5	0.5
SN13	10397.8	8641.4	-0.1
SN14	10409.9	8632.1	-0.2

NOTE: *VERTICAL DATUM NAVD 88 PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.
*HORIZONTAL DATUM PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.

PAMALA LYNN SAGER
43618

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NORD DOOR SITE, EVERETT
SEEP ELEVATIONS AND COORDINATES
5/20/2018

SEEP ID	Northing	Easting	Ground Elevation
SN15	10492.0	8535.9	2.4
SN16	10519.3	8511.4	1.4
SN17	10531.3	8500.1	1.6
SN18	10568.4	8463.6	1.6
SN19	10585.2	8449.2	1.4
SN20	10610.9	8424.5	0.6
SN21	10666.7	8371.3	0.7
SN22	10698.9	8337.5	1.6
SN23	10750.2	8302.6	0.8
SN24	10783.6	8262.7	0.7
SN25	10855.5	8191.5	1.1
SN26	10870.5	8183.5	0.6
SN27	10952.0	8089.4	2.2
SN28	11113.5	7929.7	0.2

NOTE: *VERTICAL DATUM NAVD 88 PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.
*HORIZONTAL DATUM PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.

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NORD DOOR SITE, EVERETT
SEEP ELEVATIONS AND COORDINATES
5/20/2018

SEEP ID	Northing	Easting	Ground Elevation
SS1	9740.8	8158.8	7.3
SS2	9597.1	8078.5	6.2
SS3	9247.4	8427.1	7.2
SS4	10597.2	7477.3	2.7
SS5	10567.5	7504.9	1.9
SS6	10544.3	7528.2	1.9
SS7	10509.1	7563.7	1.6
SS8	10480.8	7588.7	1.1
SS9	10454.7	7619.6	1.2
SS10	10431.0	7639.1	1.3
SS11	10412.8	7663.6	2.8
SS12	10379.3	7695.5	3.3
SS13	10324.3	7727.5	1.8
SS14	10159.8	7913.8	5.1

NOTE: *VERTICAL DATUM NAVD 88 PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.
*HORIZONTAL DATUM PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.

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NORD DOOR SITE, EVERETT
SEEP ELEVATIONS AND COORDINATES
5/20/2018

SEEP ID	Northing	Easting	Ground Elevation
SS15	9031.1	8320.4	6.9
SS16	9002.0	8312.0	6.9
SS17	8771.5	8312.2	7.8
SS18	8900.1	8295.1	7.1
SW1	11112.8	7866.3	-1.0
SW2	11098.3	7840.8	-0.1
SW3	11038.5	7743.1	-0.7
SW4	11000.4	7676.8	-1.6
SW5	10939.3	7622.3	0.5
SW6	10914.6	7571.2	-2.1

NOTE: *VERTICAL DATUM NAVD 88 PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.
*HORIZONTAL DATUM PER W & H PACIFIC SITE MAP DATED 11/20/2006
FOR JELD WEN WATERFRONT PROPERTY, PROJECT NO. 035106.

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ATTACHMENT 2

PHOTO SHEET OF GROUNDWATER SEEP SAMPLING

Example of Seep Sampling Set-up

Site Photographs May 14, 2018	**Photo Sheet 1** **Former E.A. Nord Facility** **Everett, WA**	SLR

Groundwater Seep Sample Location Seep-S-16 (adjacent to knoll area)

Site Photographs May 14, 2018	**Photo Sheet 2** **Former E.A. Nord Facility** **Everett, WA**	SLR

ATTACHMENT 3

FIELD DATA SHEETS

SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ______ Purged By: ______ Well I.D.: ______
Project Name: NORD Sampled By: AP SL Sample I.D.: Seep-S-14
Location: EVERETT, WA QA Samples: ______

Date Purged: ______ Start (2400hr): 1212 End (2400hr): 1232
Date Sampled: 05 15 2018 Sample Time (2400hr): 1214

Casing Diameter: 2" ___ 3" ___ 4" ___ 5" ___ 6" ___ 8" ___ Other ___
Casing Volume: (gallons per foot) (0.17) (0.38) (0.67) (1.02) (1.50) (2.60) ( )

Total depth (feet) = ______ Casing Volume (gal) = ______
Depth to water (feet) = ______ Minimum Purge (gal) = ______
Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
	1216	20.30	6.272	4.076	7.03	7.48	110.7	not very	clear

Tide
-1.44

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
___ Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated ______
Other: ______
Pump Intake Depth: ______ (feet)

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 40 mL amber glass
5 40 mL amber glass w/ HCl
___ ___ mL HDPE
___ ___ mL HDPE w/ HNO3
___ ___ mL HDPE w/ H2SO4
______
2 1000mL amber glass
______
______
______

Well Integrity: ______ Odor: ______
Remarks: ______

Signature:

Page 1 of 1

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ______ Purged By: ______ Well I.D.: ______

Project Name: NORD Sampled By: AP SL Sample I.D.: Seep-N-18

Location: EVERETT, WA QA Samples: ______

Date Purged: ______ Start (2400hr): 1251 End (2400hr): 1305

Date Sampled: 05/15 2018 Sample Time (2400hr): 1255

Casing Diameter:	2" ___	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet) = ______ Casing Volume (gal) = ______

Depth to water (feet) = ______ Minimum Purge (gal) = ______

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)	Tide
	1255	13.41	9.138	5.938	10.89	7.35	115.3	none	clear	-1.13

PURGING & SAMPLING EQUIPMENT

- ___ Well Wizard Bladder Pump
- ___ Active Extraction Well Pump
- ___ Submersible Pump
- ___ Peristaltic Pump
- ___ Bailer (disposable)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated ______

Other: ______

Pump Intake Depth: ______ (feet)

SAMPLE VESSELS

- ___ 40mL VOA
- ___ 40mL VOA w/ HCL
- 2 40 mL amber glass
- 5 40 mL amber glass w/ HCl
- ___ ___ mL HDPE
- ___ ___ mL HDPE w/ HNO3
- ___ ___ mL HDPE w/ H2SO4
- 2x 1000 mL amberglass

Well Integrity: ______ Odor: ______

Remarks: ______

Signature: Page 1 of 1

SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ____________ Purged By: ____________ Well I.D.: ____________

Project Name: NORD Sampled By: AP DL Sample I.D.: Seep-N-14

Location: EVERETT, WA QA Samples: ____________

Date Purged: ____________ Start (2400hr): 1318 End (2400hr): 1332

Date Sampled: 0515 2018 Sample Time (2400hr): 1321

Casing Diameter:	2" ___	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet) = ____________ Casing Volume (gal) = ____________

Depth to water (feet) = ____________ Minimum Purge (gal) = ____________

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
	1330	13.44	8.305	5.395	9.04	7.65	-77.8	cloudy	light brown

Tide -0.1

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump

___ Active Extraction Well Pump

___ Submersible Pump

___ Peristaltic Pump

___ Bailer (disposable)

___ Bailer (PVC)

___ Bailer (Stainless Steel)

___ Dedicated ________

Other: ____________

Pump Intake Depth: ________ (feet)

SAMPLE VESSELS

___ 40mL VOA

___ 40mL VOA w/ HCL

2 40 mL amber glass

5 40 mL amber glass w/ HCl

___ ___ mL HDPE

___ ___ mL HDPE w/ HNO3

___ ___ mL HDPE w/ H2SO4

2 1000 mL amber glass

Well Integrity: ____________ Odor: ____________

Remarks: ____________

Signature:

Page 1 of 1

SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ____________ Purged By: ____________ Well I.D.: ____________

Project Name: NORD Sampled By: AP SL Sample I.D.: Seep-N-2

Location: EVERETT, WA QA Samples: ____________

Date Purged: ____________ Start (2400hr): 1406 End (2400hr): 1415

Date Sampled: 0515 2018 Sample Time (2400hr): 1408

Casing Diameter:	2" ___	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet) = ____________ Casing Volume (gal) = ____________

Depth to water (feet) = ____________ Minimum Purge (gal) = ____________

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
	1413	13.10	9.183	5.964	11.15	7.20	70.8	slight	clear

Tide 1.40

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
___ Peristaltic Pump
Other: ____________
Pump Intake Depth: ________ (feet)

___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated ________

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 40 mL amber glass
5 40 mL amber glass w/ HCl
___ ___ mL HDPE
___ ___ mL HDPE w/ HNO3

___ ___ mL HDPE w/ H2SO4
____
2 1000mL amber glass
____
____
____

Well Integrity: ____________ Odor: ____________

Remarks: ____________

Signature:

Page 1 of 1

SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ____________ Purged By: ____________ Well I.D.: ____________

Project Name: NORD Sampled By: AP SL Sample I.D.: Seep-S-1

Location: EVERETT, WA QA Samples: ____________

Date Purged: ____________ Start (2400hr): 1455 End (2400hr): 1510

Date Sampled: 05 14 2018 Sample Time (2400hr): 1455

Casing Diameter:	2" ___	3" ___	4" ___	5" ___	6" ___	8" ___	Other ___
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet) = ____________ Casing Volume (gal) = ____________

Depth to water (feet) = ____________ Minimum Purge (gal) = ____________

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
	1455	17.05	5.074	3.299	9.74	8.13	38.6		clear

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump ___ Bailer (disposable)

___ Active Extraction Well Pump ___ Bailer (PVC)

___ Submersible Pump ___ Bailer (Stainless Steel)

___ Peristaltic Pump ___ Dedicated ________

Other: ____________

Pump Intake Depth: ________ (feet)

SAMPLE VESSELS

___ 40mL VOA

___ 40mL VOA w/ HCL

2 40 mL amber glass

5 40 mL amber glass w/ HCl

___ ___ mL HDPE

___ ___ mL HDPE w/ HNO3

___ ___ mL HDPE w/ H2SO4

2 1000mL amber glass

Well Integrity: ____________ Odor: ____________

Remarks: ____________

Signature: Page 1 of 1

SLR

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. ____________ Purged By: ____________ Well I.D.: ____________
Project Name: NORD DOOR Sampled By: AP SL Sample I.D.: Seep-S-16
Location: EVERETT QA Samples: ____________

Date Purged: ____________ Start (2400hr): 1342 & 1412 End (2400hr): 1432
Date Sampled: 0514 2018 Sample Time (2400hr): 1342 & 1412

Casing Diameter: 2" ___ 3" ___ 4" ___ 5" ___ 6" ___ 8" ___ Other ___
Casing Volume: (gallons per foot) (0.17) (0.38) (0.67) (1.02) (1.50) (2.60) ( )

Total depth (feet) = ____________ Casing Volume (gal) = ____________
Depth to water (feet) = ____________ Minimum Purge (gal) = ____________
Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
	1340	13.62	8.632	5.611	6.24	7.55	-207.8	very	black

* DUPLICATE SAMPLE LOCATION *

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
___ Peristaltic Pump
Other: ____________
Pump Intake Depth: ________ (feet)

___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated ________

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 40 mL amber glass
5 40 mL amber glass w/ HCl
___ ___ mL HDPE
___ ___ mL HDPE w/ HNO3

___ ___ mL HDPE w/ H2SO4
2 1000mL amber glass

Well Integrity: ____________ Odor: ____________
Remarks: moved about 18-20ft to the North

Signature:

Page 1 of 1

SEEP-S-9

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

SLR

Project No. ______ Purged By: ______ Well I.D.: ______

Project Name: NORD DOOR Sampled By: AP SL Sample I.D.: Seep-S-9

Location: EVERETT, WA QA Samples: ______

Date Purged: ______ Start (2400hr): 1236 End (2400hr): 1302

Date Sampled: 05142018 Sample Time (2400hr): 1248

Casing Diameter: 2" ___ 3" ___ 4" ___ 5" ___ 6" ___ 8" ___ Other ___

Casing Volume: (gallons per foot) (0.17) (0.38) (0.67) (1.02) (1.50) (2.60) ( )

Total depth (feet) = ______ Casing Volume (gal) = ______

Depth to water (feet) = ______ Minimum Purge (gal) = ______

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

LOCATION ~~Volume~~ (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)
S-9	1236	13.84	13.92	9.052	8.23	7.06	105.0	yes	milky/cloudy
	~~1248~~ up								

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
___ Peristaltic Pump
Other: ______
Pump Intake Depth: ______ (feet)

___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated ______

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
2 40 mL amber glass
5 40 mL amber glass w/ HCl
___ ___ mL HDPE
___ ___ mL HDPE w/ HNO3

___ ___ mL HDPE w/ H2SO4
2 1000 mL amber glass

Well Integrity: ______ Odor: ______

Remarks: ______

Signature: Page 1 of 1

* no dioxin sample

GW Sample Data Sheet - Low Flow.doc SLR International Corp

ATTACHMENT 4

LABORATORY ANALYTICAL REPORTS

Groundwater Seep Sampling

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'Xx' denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

Sample ID: Seep-N-2 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.98 L	Lab Sample ID	B2267_15888_DF_001	Date Extracted:	24-May-2018
Date Collected:	15-May-2018	pH:	6	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	3:59:04

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	6.7			ES 2378-TCDD	97.2	
12378-PeCDD	ND	4.17			ES 12378-PeCDD	106	
123478-HxCDD	ND	3.4			ES 123478-HxCDD	89.4	
123678-HxCDD	ND	3.62			ES 123678-HxCDD	86.6	
123789-HxCDD	ND	3.35			ES 123789-HxCDD	91.4	
1234678-HpCDD	EMPC		12.2	J	ES 1234678-HpCDD	96.5	
OCDD	135				ES OCDD	68.8	
2378-TCDF	ND	5.75			ES 2378-TCDF	100	
12378-PeCDF	ND	2.88			ES 12378-PeCDF	97	
23478-PeCDF	ND	2.74			ES 23478-PeCDF	106	
123478-HxCDF	ND	3.2			ES 123478-HxCDF	94.1	
123678-HxCDF	ND	2.9			ES 123678-HxCDF	90.1	
234678-HxCDF	ND	2.74			ES 234678-HxCDF	98.3	
123789-HxCDF	ND	3.01			ES 123789-HxCDF	98.8	
1234678-HpCDF	EMPC		1.35	J	ES 1234678-HpCDF	111	
1234789-HpCDF	ND	1.75			ES 1234789-HpCDF	98.7	
OCDF	EMPC		6.75	J	ES OCDF	78.3	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	104	
Total TCDD	ND	6.7	ND		CS 12347-PeCDD	114	
Total PeCDD	ND	4.17	ND		CS 12346-PeCDF	114	
Total HxCDD	ND	3.44	ND		CS 123469-HxCDF	104	
Total HpCDD	18.8		31		CS 1234689-HpCDF	114	
Total TCDF	ND	5.75	ND				
Total PeCDF	ND	2.81	ND				
Total HxCDF	ND	2.95	ND				
Total HpCDF	ND		5.89				
Total PCDD/Fs	**153**		**178**				
ITEF TEQs							
TEQ: ND=0	0.135		0.277				
TEQ: ND=DL/2	6.69	6.59	6.83				
TEQ: ND=DL	13.3	13.2	13.4				

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Sample ID: Seep-N-14

Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.97 L	Lab Sample ID	B2267_15888_DF_002	Date Extracted:	24-May-2018
Date Collected:	15-May-2018	pH:	6	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	4:50:38

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	6.67			ES 2378-TCDD	100	
12378-PeCDD	ND	4.75			ES 12378-PeCDD	106	
123478-HxCDD	ND	6			ES 123478-HxCDD	90.2	
123678-HxCDD	ND	6.06			ES 123678-HxCDD	90.1	
123789-HxCDD	ND	5.74			ES 123789-HxCDD	91.9	
1234678-HpCDD	EMPC		17.6	J	ES 1234678-HpCDD	102	
OCDD	247				ES OCDD	75.8	
2378-TCDF	ND	5.29			ES 2378-TCDF	100	
12378-PeCDF	ND	2.35			ES 12378-PeCDF	96.1	
23478-PeCDF	ND	2.25			ES 23478-PeCDF	104	
123478-HxCDF	ND	3.31			ES 123478-HxCDF	99.2	
123678-HxCDF	ND	3.17			ES 123678-HxCDF	92.8	
234678-HxCDF	ND	3.12			ES 234678-HxCDF	99.8	
123789-HxCDF	ND	3.53			ES 123789-HxCDF	106	
1234678-HpCDF	EMPC		4.09	J	ES 1234678-HpCDF	110	
1234789-HpCDF	ND	2.8			ES 1234789-HpCDF	109	
OCDF	EMPC		6.24	J	ES OCDF	91.6	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	110	
Total TCDD	ND	6.67	ND		CS 12347-PeCDD	115	
Total PeCDD	ND	4.75	ND		CS 12346-PeCDF	111	
Total HxCDD	ND		8.69		CS 123469-HxCDF	110	
Total HpCDD	35.6		53.2		CS 1234689-HpCDF	124	
Total TCDF	ND	5.29	ND				
Total PeCDF	ND	2.3	ND				
Total HxCDF	ND	3.27	ND				
Total HpCDF	ND		9.68				
Total PCDD/Fs	**282**		**325**				
ITEF TEQs							
TEQ: ND=0	0.247		0.47				
TEQ: ND=DL/2	7.22	7.01	7.44				
TEQ: ND=DL	14.2	14	14.4				

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Sample ID: Seep-N-18 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.97 L	Lab Sample ID	B2267_15888_DF_003	Date Extracted:	24-May-2018
Date Collected:	15-May-2018	pH:	6	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	5:42:12

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	7.1			ES 2378-TCDD	101	
12378-PeCDD	ND	3.04			ES 12378-PeCDD	105	
123478-HxCDD	ND	4.92			ES 123478-HxCDD	94.9	
123678-HxCDD	ND	4.78			ES 123678-HxCDD	93.1	
123789-HxCDD	ND	4.85			ES 123789-HxCDD	92.1	
1234678-HpCDD	ND	4.12			ES 1234678-HpCDD	97.1	
OCDD	ND	9.29			ES OCDD	68	
2378-TCDF	ND	5.56			ES 2378-TCDF	99.2	
12378-PeCDF	ND	3.19			ES 12378-PeCDF	90.8	
23478-PeCDF	ND	2.97			ES 23478-PeCDF	97.5	
123478-HxCDF	ND	4.14			ES 123478-HxCDF	103	
123678-HxCDF	ND	3.96			ES 123678-HxCDF	98.7	
234678-HxCDF	ND	3.99			ES 234678-HxCDF	101	
123789-HxCDF	ND	4.57			ES 123789-HxCDF	102	
1234678-HpCDF	ND	1.96			ES 1234678-HpCDF	108	
1234789-HpCDF	ND	2.82			ES 1234789-HpCDF	97.4	
OCDF	ND	8.38			ES OCDF	80.9	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	108	
Total TCDD	ND	7.1	ND		CS 12347-PeCDD	115	
Total PeCDD	ND	3.04	ND		CS 12346-PeCDF	105	
Total HxCDD	ND	4.84	ND		CS 123469-HxCDF	113	
Total HpCDD	ND	4.12	ND		CS 1234689-HpCDF	119	
Total TCDF	ND	5.56	ND				
Total PeCDF	ND	3.08	ND				
Total HxCDF	ND	4.15	ND				
Total HpCDF	ND	2.33	ND				
Total PCDD/Fs	**ND**		**ND**				
ITEF TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	7.03	7.03	7.03				
TEQ: ND=DL	14.1	14.1	14.1				

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Checkcode: 015-901-HBN SGS North America - DF v0.50 Report Created: 13-Jun-2018 15:09 Analyst: FS

Sample ID: Seep-S-1

Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.95 L	Lab Sample ID	B2267_15888_DF_004	Date Extracted:	24-May-2018
Date Collected:	14-May-2018	pH:	5	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	6:33:46

Analyte	**Conc. (pg/L)**	**DL (pg/L)**	**EMPC (pg/L)**	**Qualifiers**	**Standard**	**ES Recoveries**	**Qualifiers**
2378-TCDD	ND	6.47			ES 2378-TCDD	102	
12378-PeCDD	ND	3.28			ES 12378-PeCDD	111	
123478-HxCDD	ND	4.9			ES 123478-HxCDD	97.8	
123678-HxCDD	ND	4.7			ES 123678-HxCDD	96.5	
123789-HxCDD	ND	4.89			ES 123789-HxCDD	96.7	
1234678-HpCDD	EMPC		7.65	J	ES 1234678-HpCDD	106	
OCDD	77.4				ES OCDD	87.2	
2378-TCDF	ND	4.47			ES 2378-TCDF	102	
12378-PeCDF	ND	2.55			ES 12378-PeCDF	95.2	
23478-PeCDF	ND	2.37			ES 23478-PeCDF	105	
123478-HxCDF	ND	3.19			ES 123478-HxCDF	107	
123678-HxCDF	ND	2.87			ES 123678-HxCDF	100	
234678-HxCDF	ND	2.84			ES 234678-HxCDF	108	
123789-HxCDF	ND	3.21			ES 123789-HxCDF	109	
1234678-HpCDF	ND	1.37			ES 1234678-HpCDF	120	
1234789-HpCDF	ND	1.95			ES 1234789-HpCDF	111	
OCDF	ND	5.77			ES OCDF	99.1	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	105	
Total TCDD	ND	6.47	ND		CS 12347-PeCDD	115	
Total PeCDD	ND	3.28	ND		CS 12346-PeCDF	110	
Total HxCDD	ND	4.82	ND		CS 123469-HxCDF	114	
Total HpCDD	ND		16.4		CS 1234689-HpCDF	128	
Total TCDF	ND	4.47	ND				
Total PeCDF	ND	2.46	ND				
Total HxCDF	ND	3.02	ND				
Total HpCDF	ND	1.63	ND				
Total PCDD/Fs	**77.4**		**93.8**				
ITEF TEQs							
TEQ: ND=0	0.0774		0.154				
TEQ: ND=DL/2	6.36	6.3	6.44				
TEQ: ND=DL	12.6	12.6	12.7				

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Sample ID: Seep-S-14 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.94 L	Lab Sample ID	B2267_15888_DF_006	Date Extracted:	24-May-2018
Date Collected:	15-May-2018	pH:	6	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	7:25:21

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	6.55			ES 2378-TCDD	96.8	
12378-PeCDD	ND	5.67			ES 12378-PeCDD	105	
123478-HxCDD	ND	4.51			ES 123478-HxCDD	93.8	
123678-HxCDD	ND	4.57			ES 123678-HxCDD	90.3	
123789-HxCDD	ND	4.63			ES 123789-HxCDD	93.7	
1234678-HpCDD	EMPC		13.3	J	ES 1234678-HpCDD	101	
OCDD	EMPC		45.2	J	ES OCDD	62.9	
2378-TCDF	ND	5.76			ES 2378-TCDF	97.1	
12378-PeCDF	ND	3.43			ES 12378-PeCDF	91.7	
23478-PeCDF	ND	3.39			ES 23478-PeCDF	101	
123478-HxCDF	ND	3.27			ES 123478-HxCDF	101	
123678-HxCDF	ND	3.14			ES 123678-HxCDF	94.9	
234678-HxCDF	ND	2.95			ES 234678-HxCDF	101	
123789-HxCDF	ND	3.39			ES 123789-HxCDF	105	
1234678-HpCDF	6.95			J	ES 1234678-HpCDF	108	
1234789-HpCDF	ND	2.38			ES 1234789-HpCDF	104	
OCDF	ND	8.52			ES OCDF	79.7	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	109	
Total TCDD	ND	6.55	ND		CS 12347-PeCDD	115	
Total PeCDD	ND	5.67	ND		CS 12346-PeCDF	112	
Total HxCDD	ND		23.1		CS 123469-HxCDF	113	
Total HpCDD	21.9		35.1		CS 1234689-HpCDF	124	
Total TCDF	ND	5.76	ND				
Total PeCDF	ND	3.41	ND				
Total HxCDF	ND	3.18	ND				
Total HpCDF	14.8		14.8				
Total PCDD/Fs	**36.6**		**118**				
ITEF TEQs							
TEQ: ND=0	0.0695		0.247				
TEQ: ND=DL/2	7.32	7.29	7.5				
TEQ: ND=DL	14.6	14.6	14.7				

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Report Created: 13-Jun-2018 15:09 Analyst: FS

Sample ID: Seep-S-16 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.98 L	Lab Sample ID	B2267_15888_DF_007	Date Extracted:	24-May-2018
Date Collected:	14-May-2018	pH:	7	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	8:16:55

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	7.33			ES 2378-TCDD	91	
12378-PeCDD	ND	4.43			ES 12378-PeCDD	97.8	
123478-HxCDD	ND	4.99			ES 123478-HxCDD	92.7	
123678-HxCDD	ND	4.7			ES 123678-HxCDD	94.6	
123789-HxCDD	ND	4.4			ES 123789-HxCDD	96.1	
1234678-HpCDD	ND	3.19			ES 1234678-HpCDD	97.7	
OCDD	EMPC		14.7	J	ES OCDD	60.5	
2378-TCDF	ND	5.74			ES 2378-TCDF	95.8	
12378-PeCDF	ND	3.05			ES 12378-PeCDF	88.1	
23478-PeCDF	ND	2.83			ES 23478-PeCDF	99.7	
123478-HxCDF	ND	3.54			ES 123478-HxCDF	100	
123678-HxCDF	ND	3.54			ES 123678-HxCDF	94	
234678-HxCDF	ND	3.29			ES 234678-HxCDF	104	
123789-HxCDF	ND	3.63			ES 123789-HxCDF	108	
1234678-HpCDF	ND	1.45			ES 1234678-HpCDF	107	
1234789-HpCDF	ND	1.9			ES 1234789-HpCDF	105	
OCDF	ND	7.06			ES OCDF	79.8	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	102	
Total TCDD	ND	7.33	ND		CS 12347-PeCDD	110	
Total PeCDD	ND	4.43	ND		CS 12346-PeCDF	107	
Total HxCDD	ND	4.67	ND		CS 123469-HxCDF	114	
Total HpCDD	ND	3.19	ND		CS 1234689-HpCDF	121	
Total TCDF	ND	5.74	ND				
Total PeCDF	ND	2.94	ND				
Total HxCDF	ND	3.49	ND				
Total HpCDF	ND	1.66	ND				
Total PCDD/Fs	**ND**		**14.7**				
ITEF TEQs							
TEQ: ND=0	0		0.0147				
TEQ: ND=DL/2	7.29	7.29	7.3				
TEQ: ND=DL	14.6	14.6	14.6				

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Sample ID: Method Blank B2267_15888 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2267	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	1.00 L	Lab Sample ID	MB1_15888_DF_TLX	Date Extracted:	24-May-2018
Date Collected:	n/a	pH:	n/a	QC Batch No:	15888	Date Analyzed:	13-Jun-2018
		Split:	-	Dilution:	-	Time Analyzed:	3:07:30

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	3.55			ES 2378-TCDD	102	
12378-PeCDD	ND	4.01			ES 12378-PeCDD	71.5	
123478-HxCDD	ND	4.9			ES 123478-HxCDD	90.9	
123678-HxCDD	ND	5.21			ES 123678-HxCDD	89.2	
123789-HxCDD	ND	4.72			ES 123789-HxCDD	92.8	
1234678-HpCDD	ND	2.58			ES 1234678-HpCDD	99.3	
OCDD	ND	7.91			ES OCDD	61.2	
2378-TCDF	ND	3.82			ES 2378-TCDF	101	
12378-PeCDF	ND	1.8			ES 12378-PeCDF	67.4	
23478-PeCDF	ND	1.77			ES 23478-PeCDF	70.8	
123478-HxCDF	ND	2.93			ES 123478-HxCDF	100	
123678-HxCDF	ND	2.95			ES 123678-HxCDF	92.2	
234678-HxCDF	ND	2.79			ES 234678-HxCDF	99.6	
123789-HxCDF	ND	3.04			ES 123789-HxCDF	107	
1234678-HpCDF	ND	1.19			ES 1234678-HpCDF	106	
1234789-HpCDF	ND	1.53			ES 1234789-HpCDF	104	
OCDF	ND	5.78			ES OCDF	76.9	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	107	
Total TCDD	ND	3.55	ND		CS 12347-PeCDD	76.1	
Total PeCDD	ND	4.01	ND		CS 12346-PeCDF	90.8	
Total HxCDD	ND	4.92	ND		CS 123469-HxCDF	108	
Total HpCDD	ND	2.58	ND		CS 1234689-HpCDF	119	
Total TCDF	ND	3.82	ND				
Total PeCDF	ND	1.79	ND				
Total HxCDF	ND	2.92	ND				
Total HpCDF	ND	1.35	ND				
Total PCDD/Fs	**ND**		**ND**				
ITEF TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	4.82	4.82	4.82				
TEQ: ND=DL	9.64	9.64	9.64				

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METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_09062018_22NOV2017		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	180612B12	Analysis Date:	13-JUN-2018 01:24:23
Lab ID:	OPR1_15888_DF		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	11.4	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	55.4	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	59.5	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	58	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	54.8	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	55.5	35	-	70	Y
OCDD	100	114	78	-	144	Y
2,3,7,8-TCDF	10	11.8	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	56.3	40	-	67	Y
2,3,4,7,8-PeCDF	50	59.7	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	55.3	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	55.3	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	55.2	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	54.8	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	58.6	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	54.3	39	-	69	Y
OCDF	100	116	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 13 Jun 2018 15:09 Analyst: FS

METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_09062018_22NOV2017		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	180612B12	Analysis Date:	13-JUN-2018 01:24:23
Lab ID:	OPR1_15888_DF		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	97	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	99.4	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	91.8	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	92.5	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	94.9	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	94.9	26	-	166	Y
13C-OCDD	200	125	26	-	397	Y
13C-2,3,7,8-TCDF	100	99.6	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	92.5	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	99	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	97.2	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	92.4	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	99	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	97.4	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	95.6	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	94.8	20	-	186	Y
13C-OCDF	200	155	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	42.7	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 13 Jun 2018 15:09 Analyst: FS

Sample ID: Seep-S-1

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.95 L	Sample ID:	B2267_15900_PCB_004-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	08-Jun-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	6.49			ES PCB-1	23.2
PCB-81 344'5-TeCB	ND	7.77			ES PCB-3	34.6
PCB-105 233'44'-PeCB	ND	8.91			ES PCB-4	33.9
PCB-114 2344'5-PeCB	ND	11.3			ES PCB-15	69.6
PCB-118 23'44'5-PeCB	EMPC		20.2		ES PCB-19	45.1
PCB-123 23'44'5'-PeCB	ND	10.7			ES PCB-37	87.3
PCB-126 33'44'5-PeCB	ND	8.68			ES PCB-54	55.2
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	8.66		C	ES PCB-77	109
PCB-167 23'44'55'-HxCB	ND	8.25			ES PCB-81	98.4
PCB-169 33'44'55'-HxCB	ND	9.09			ES PCB-104	73.4
PCB-189 233'44'55'-HpCB	ND	6.96			ES PCB-105	104
					ES PCB-114	83.3
TEQs (WHO 2005 M/H)					ES PCB-118	94.5
					ES PCB-123	95.5
ND = 0	0		0.000607		ES PCB-126	96.8
ND = 0.5 x DL	0.573		0.573		ES PCB-153	85.8
ND = DL	1.15		1.15		ES PCB-155	69.6
					ES PCB-156/157	95.3
Totals					ES PCB-167	72.1
Mono-CB	ND	16			ES PCB-169	78.8
Di-CB	229				ES PCB-170	66.7
Tri-CB	14.8				ES PCB-180	75.7
Tetra-CB	26.2		43.6		ES PCB-188	95.5
Penta-CB	53.5		73.7		ES PCB-189	84.7
Hexa-CB	56.9		87.1		ES PCB-202	95.9
Hepta-CB			11.7		ES PCB-205	94.3
Octa-CB	ND	10.1			ES PCB-206	93.6
Nona-CB	ND	12.4			ES PCB-208	79.8
Deca-CB	ND	17.9			ES PCB-209	122
					CS PCB-28	75.3
Total PCB (Mono-Deca)	381		460		CS PCB-111	93.7
					CS PCB-178	91.3

Checkcode: 923-581-BRM/A SGS North America - PCB v0.82 Report Created: 12-Jun-2018 09:25 Analyst: as

Sample ID: Seep-S-1

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.95 L	Sample ID:	B2267_15900_PCB_004-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	08-Jun-2018
		Units	pg/L	Checkcode:	923-581-BRM/A	Time Analyzed:	23:55:05

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(17.3)		PCB-19	(49.7)		PCB-54	(11.2)		PCB-72	(6.96)	
PCB-2	(15.2)		PCB-30/18	(38.7)	C	PCB-50/53	(12.7)	C	PCB-68	(6.18)	
PCB-3	(14.7)		PCB-17	(44.9)		PCB-45	(14.6)		PCB-57	(7.34)	
			PCB-27	(33.4)		PCB-51	(12.3)		PCB-58	(7)	
Conc.	0		PCB-24	(33.8)		PCB-46	(15.5)		PCB-67	(6.65)	
EMPC	0		PCB-16	(56.8)		PCB-52	[10.9]	EMPC	PCB-63	(6.47)	
			PCB-32	(30.7)		PCB-73	(9.68)		PCB-61/70/74/76	26.2	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(13.3)		PCB-43	(14.6)		PCB-66	[6.48]	J EMPC
PCB-4	(51.2)		PCB-23	(12.6)		PCB-69/49	(10.7)	C	PCB-55	(7.37)	
PCB-10	(36.2)		PCB-26/29	(12.6)	C	PCB-48	(12.8)		PCB-56	(7.7)	
PCB-9	(27.2)		PCB-25	(12.1)		PCB-44/47/65	(11.7)	C	PCB-60	(7.36)	
PCB-7	(23.9)		PCB-31	(11.6)		PCB-59/62/75	(9.13)	C	PCB-80	(6.44)	
PCB-6	(25.6)		PCB-28/20	14.8	J C	PCB-42	(14.1)		PCB-79	(5.95)	
PCB-5	(25.5)		PCB-21/33	(12)	C	PCB-41	(15.2)		PCB-78	(7.91)	
PCB-8	(24.2)		PCB-22	(13.1)		PCB-71/40	(12.7)	C	PCB-81	(7.77)	
PCB-14	(21.1)		PCB-36	(12.2)		PCB-64	(8.67)		PCB-77	(6.49)	
PCB-11	229		PCB-39	(11.5)							
PCB-13/12	(24)	C	PCB-38	(12.4)							
PCB-15	(24.8)		PCB-35	(13.2)							
			PCB-37	(12.2)							
Conc.	229		**Conc.**	14.8					**Conc.**	26.2	
EMPC	229		**EMPC**	14.8					**EMPC**	43.6	

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Totals	Conc.	EMPC
Mono-Tri	244	244
Tetra-Hexa	137	204
Hepta-Deca	0	11.7
Mono-Deca	381	460

Sample ID: Seep-S-1 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(8.36)		PCB-108/119/86/97/125/87	(11.8)	C	PCB-155	(8.73)		PCB-165	(7.99)	
PCB-96	(10.4)		PCB-117	(10.4)		PCB-152	(9.14)		PCB-146	(9.38)	
PCB-103	(13.3)		PCB-116/85	(12.8)	C	PCB-150	(9.33)		PCB-161	(7.15)	
PCB-94	(15.3)		PCB-110	39.8		PCB-136	(10.3)		PCB-153/168	22.9	C
PCB-95	13.7		PCB-115	(10.8)		PCB-145	(9.76)		PCB-141	(9.74)	
PCB-100/93	(13.6)	C	PCB-82	(16.5)		PCB-148	(9.42)		PCB-130	(11.5)	
PCB-102	(13.1)		PCB-111	(9.64)		PCB-151/135	[8.89]	J EMPC C	PCB-137	(9.02)	
PCB-98	(15)		PCB-120	(10.1)		PCB-154	(8.52)		PCB-164	(8.14)	
PCB-88	(14.3)		PCB-107/124	(10.9)	C	PCB-144	(9.56)		PCB-163/138/129	[21.3]	J EMPC C
PCB-91	(13.6)		PCB-109	(10)		PCB-147/149	33.9	C	PCB-160	(8.22)	
PCB-84	(16.8)		PCB-123	(10.7)		PCB-134	(13.4)		PCB-158	(7.11)	
PCB-89	(15.5)		PCB-106	(11.2)		PCB-143	(9.39)		PCB-128/166	(8.39)	C
PCB-121	(10.3)		PCB-118	[20.2]	EMPC	PCB-139/140	(9.41)	C	PCB-159	(7.27)	
PCB-92	(15.1)		PCB-122	(12.7)		PCB-131	(10.8)		PCB-162	(7.46)	
PCB-113/90/101	(12)	C	PCB-114	(11.3)		PCB-142	(11.1)		PCB-167	(8.25)	
PCB-83	(18.2)		PCB-105	(8.91)		PCB-132	(10.7)		PCB-156/157	(8.66)	C
PCB-99	(12.3)		PCB-127	(8.77)		PCB-133	(9.75)		PCB-169	(9.09)	
PCB-112	(10.8)		PCB-126	(8.68)							
			Conc.	53.5					**Conc.**	56.9	
			EMPC	73.7					**EMPC**	87.1	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(5.43)		PCB-174	(13.2)		PCB-202	(9.42)		PCB-208	(8.73)	
PCB-179	(6.68)		PCB-177	(13.1)		PCB-201	(9.82)		PCB-207	(8.36)	
PCB-184	(6.84)		PCB-181	(11.4)		PCB-204	(10.4)		PCB-206	(16.1)	
PCB-176	(6.16)		PCB-171/173	(13.3)	C	PCB-197	(9.56)				
PCB-186	(6.63)		PCB-172	(12.5)		PCB-200	(10.2)		**Conc.**	0	
PCB-178	(9.15)		PCB-192	(9.78)		PCB-198/199	(14)	C	**EMPC**	0	
PCB-175	(11.7)		PCB-180/193	[11.7]	J EMPC C	PCB-196	(14)				
PCB-187	(10.7)		PCB-191	(9.33)		PCB-203	(13.6)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(10.5)		PCB-170	(13.9)		PCB-195	(14.2)		PCB-209	(17.9)	
PCB-183	(10.6)		PCB-190	(9.48)		PCB-194	(13.1)				
PCB-185	(10.9)		PCB-189	(6.96)		PCB-205	(10.7)				
			Conc.	0		**Conc.**	0				
			EMPC	11.7		**EMPC**	0				

Sample ID: Seep-S-9

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.96 L	Sample ID:	B2267_15900_PCB_005-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	12.1			ES PCB-1	15.1
PCB-81 344'5-TeCB	ND	14.3			ES PCB-3	24.3
PCB-105 233'44'-PeCB	ND	15.3			ES PCB-4	25.9
PCB-114 2344'5-PeCB	ND	12.6			ES PCB-15	57
PCB-118 23'44'5-PeCB	19.5				ES PCB-19	34.6
PCB-123 23'44'5'-PeCB	ND	13.8			ES PCB-37	65.1
PCB-126 33'44'5-PeCB	ND	7.44			ES PCB-54	26
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	15.5		C	ES PCB-77	90.3
PCB-167 23'44'55'-HxCB	ND	10.5			ES PCB-81	86.5
PCB-169 33'44'55'-HxCB	ND	14.3			ES PCB-104	35.8
PCB-189 233'44'55'-HpCB	ND	14.8			ES PCB-105	74.6
					ES PCB-114	71
TEQs (WHO 2005 M/H)					ES PCB-118	73.1
					ES PCB-123	78.4
ND = 0	0.000585		0.000585		ES PCB-126	83.5
ND = 0.5 x DL	0.592		0.592		ES PCB-153	61.6
ND = DL	1.18		1.18		ES PCB-155	39
					ES PCB-156/157	62.8
Totals					ES PCB-167	62.3
Mono-CB	ND	39.5			ES PCB-169	57.8
Di-CB	ND	91.7			ES PCB-170	70.3
Tri-CB	ND	48.6			ES PCB-180	66.5
Tetra-CB	ND	18.1			ES PCB-188	62
Penta-CB	39				ES PCB-189	69
Hexa-CB	18.9		33.2		ES PCB-202	70.7
Hepta-CB	ND	13.3			ES PCB-205	64.5
Octa-CB	ND	17.4			ES PCB-206	67.1
Nona-CB	ND	23.8			ES PCB-208	69.8
Deca-CB	ND	26.6			ES PCB-209	84
					CS PCB-28	80.2
Total PCB (Mono-Deca)	57.9		72.2		CS PCB-111	104
					CS PCB-178	110

Checkcode: 123-707-STG/A SGS North America - PCB v0.82 Report Created: 12-Jun-2018 09:28 Analyst: as

Sample ID: Seep-S-9

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.96 L	Sample ID:	B2267_15900_PCB_005-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018
		Units	pg/L	Checkcode:	123-707-STG/A	Time Analyzed:	00:54:36

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(46.1)		PCB-19	(79.2)		PCB-54	(33.2)		PCB-72	(12.8)	
PCB-2	(34.1)		PCB-30/18	(61.8)	C	PCB-50/53	(15.2)	C	PCB-68	(11.4)	
PCB-3	(33)		PCB-17	(71.6)		PCB-45	(17.4)		PCB-57	(13.5)	
			PCB-27	(53.3)		PCB-51	(14.7)		PCB-58	(12.9)	
Conc.	0		PCB-24	(53.9)		PCB-46	(18.6)		PCB-67	(12.2)	
EMPC	0		PCB-16	(90.6)		PCB-52	(15.5)		PCB-63	(11.9)	
			PCB-32	(49)		PCB-73	(11.6)		PCB-61/70/74/76	(12.6)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(19.4)		PCB-43	(17.5)		PCB-66	(13.8)	
PCB-4	(124)		PCB-23	(18.4)		PCB-69/49	(12.8)	C	PCB-55	(13.6)	
PCB-10	(87.6)		PCB-26/29	(18.5)	C	PCB-48	(15.3)		PCB-56	(14.2)	
PCB-9	(64.8)		PCB-25	(17.7)		PCB-44/47/65	(14)	C	PCB-60	(13.5)	
PCB-7	(57)		PCB-31	(16.9)		PCB-59/62/75	(10.9)	C	PCB-80	(11.8)	
PCB-6	(61)		PCB-28/20	(18.2)	C	PCB-42	(16.8)		PCB-79	(10.9)	
PCB-5	(60.7)		PCB-21/33	(17.5)	C	PCB-41	(18.2)		PCB-78	(14.5)	
PCB-8	(57.8)		PCB-22	(19.2)		PCB-71/40	(15.3)	C	PCB-81	(14.3)	
PCB-14	(50.2)		PCB-36	(17.9)		PCB-64	(10.4)		PCB-77	(12.1)	
PCB-11	(59.4)		PCB-39	(16.8)							
PCB-13/12	(57.3)	C	PCB-38	(18.1)							
PCB-15	(59.2)		PCB-35	(19.2)							
			PCB-37	(17.9)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	0		**EMPC**	0					**EMPC**	0	

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Totals	Conc.	EMPC
Mono-Tri	0	0
Tetra-Hexa	57.9	72.2
Hepta-Deca	0	0
Mono-Deca	57.9	72.2

Sample ID: Seep-S-9 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(21.7)		PCB-108/119/86/97/125/87	(15.2)	C	PCB-155	(16.2)		PCB-165	(12.4)	
PCB-96	(27)		PCB-117	(13.4)		PCB-152	(17)		PCB-146	(14.6)	
PCB-103	(17.1)		PCB-116/85	(16.5)	C	PCB-150	(17.3)		PCB-161	(11.1)	
PCB-94	(19.6)		PCB-110	19.5		PCB-136	(19.1)		PCB-153/168	18.9	J C
PCB-95	(17.9)		PCB-115	(13.9)		PCB-145	(18.1)		PCB-141	(15.1)	
PCB-100/93	(17.4)	C	PCB-82	(21.1)		PCB-148	(14.7)		PCB-130	(17.9)	
PCB-102	(16.8)		PCB-111	(12.4)		PCB-151/135	(15.4)	C	PCB-137	(14)	
PCB-98	(19.3)		PCB-120	(13)		PCB-154	(13.3)		PCB-164	(12.7)	
PCB-88	(18.4)		PCB-107/124	(14.1)	C	PCB-144	(14.9)		PCB-163/138/129	[14.3]	J EMPC C
PCB-91	(17.4)		PCB-109	(12.9)		PCB-147/149	(15)	C	PCB-160	(12.8)	
PCB-84	(21.6)		PCB-123	(13.8)		PCB-134	(20.9)		PCB-158	(11.1)	
PCB-89	(19.9)		PCB-106	(14.4)		PCB-143	(14.6)		PCB-128/166	(10.7)	C
PCB-121	(13.2)		PCB-118	19.5		PCB-139/140	(14.6)	C	PCB-159	(9.27)	
PCB-92	(19.4)		PCB-122	(14.2)		PCB-131	(16.8)		PCB-162	(9.52)	
PCB-113/90/101	(15.4)	C	PCB-114	(12.6)		PCB-142	(17.2)		PCB-167	(10.5)	
PCB-83	(23.4)		PCB-105	(15.3)		PCB-132	(16.6)		PCB-156/157	(15.5)	C
PCB-99	(15.8)		PCB-127	(15)		PCB-133	(15.2)		PCB-169	(14.3)	
PCB-112	(13.8)		PCB-126	(7.44)							
			Conc.	39					**Conc.**	18.9	
			EMPC	39					**EMPC**	33.2	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(8.05)		PCB-174	(16.5)		PCB-202	(12.5)		PCB-208	(17.6)	
PCB-179	(9.91)		PCB-177	(16.3)		PCB-201	(13.1)		PCB-207	(16.8)	
PCB-184	(10.1)		PCB-181	(14.2)		PCB-204	(13.9)		PCB-206	(30)	
PCB-176	(9.14)		PCB-171/173	(16.6)	C	PCB-197	(12.7)				
PCB-186	(9.84)		PCB-172	(15.6)		PCB-200	(13.6)		**Conc.**	0	
PCB-178	(13.6)		PCB-192	(12.2)		PCB-198/199	(18.7)	C	**EMPC**	0	
PCB-175	(14.7)		PCB-180/193	(12.8)	C	PCB-196	(18.6)				
PCB-187	(13.4)		PCB-191	(11.7)		PCB-203	(18.1)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(13.2)		PCB-170	(14.8)		PCB-195	(29.2)		PCB-209	(26.6)	
PCB-183	(13.2)		PCB-190	(10.1)		PCB-194	(27)				
PCB-185	(13.7)		PCB-189	(14.8)		PCB-205	(22.2)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

Sample ID: Seep-S-14 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.95 L	Sample ID:	B2267_15900_PCB_006-R1	Date Extracted:	30-May-2018
Date Collected:	15-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	8.14			ES PCB-1	32.6
PCB-81 344'5-TeCB	ND	6.7			ES PCB-3	42
PCB-105 233'44'-PeCB	ND	8.27			ES PCB-4	39.3
PCB-114 2344'5-PeCB	ND	7.72			ES PCB-15	54.3
PCB-118 23'44'5-PeCB	ND	7.62			ES PCB-19	38.2
PCB-123 23'44'5'-PeCB	ND	7.71			ES PCB-37	74
PCB-126 33'44'5-PeCB	ND	7.72			ES PCB-54	45.7
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	12.2		C	ES PCB-77	90.4
PCB-167 23'44'55'-HxCB	ND	9.65			ES PCB-81	86.8
PCB-169 33'44'55'-HxCB	ND	10.3			ES PCB-104	56
PCB-189 233'44'55'-HpCB	ND	8.38			ES PCB-105	89.2
					ES PCB-114	80.2
TEQs (WHO 2005 M/H)					ES PCB-118	88.2
					ES PCB-123	87.5
ND = 0	0		0		ES PCB-126	85.3
ND = 0.5 x DL	0.542		0.542		ES PCB-153	80.5
ND = DL	1.08		1.08		ES PCB-155	54.5
					ES PCB-156/157	72.7
Totals					ES PCB-167	67.8
Mono-CB	ND	8.59			ES PCB-169	64.7
Di-CB	ND	23.2			ES PCB-170	66.1
Tri-CB	ND	21			ES PCB-180	77
Tetra-CB			6		ES PCB-188	91.4
Penta-CB	20.2		28.2		ES PCB-189	74.8
Hexa-CB	8.94		37.6		ES PCB-202	85
Hepta-CB	ND	6.5			ES PCB-205	76.8
Octa-CB	ND	9.57			ES PCB-206	78.4
Nona-CB	ND	17.3			ES PCB-208	79.7
Deca-CB	ND	20.1			ES PCB-209	105
					CS PCB-28	77.7
Total PCB (Mono-Deca)	29.1		71.8		CS PCB-111	90.3
					CS PCB-178	103

Checkcode: 518-487-GSB/A SGS North America - PCB v0.82 Report Created: 12-Jun-2018 09:29 Analyst: as

Sample ID: Seep-S-14

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.95 L	Sample ID:	B2267_15900_PCB_006-R1	Date Extracted:	30-May-2018
Date Collected:	15-May-2018	pH	6	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018
		Units	pg/L	Checkcode:	518-487-GSB/A	Time Analyzed:	01:54:07

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(9.22)		PCB-19	(31)		PCB-54	(10.7)		PCB-72	(6)	
PCB-2	(8.24)		PCB-30/18	(24.2)	C	PCB-50/53	(11.3)	C	PCB-68	(5.33)	
PCB-3	(7.96)		PCB-17	(28)		PCB-45	(12.9)		PCB-57	(6.33)	
			PCB-27	(20.9)		PCB-51	(10.9)		PCB-58	(6.03)	
Conc.	0		PCB-24	(21.1)		PCB-46	(13.8)		PCB-67	(5.74)	
EMPC	0		PCB-16	(35.5)		PCB-52	(11.5)		PCB-63	(5.58)	
			PCB-32	(19.2)		PCB-73	(8.6)		PCB-61/70/74/76	[6]	J EMPC C
Di	**Conc.**	**Qualifiers**	PCB-34	(11.8)		PCB-43	(12.9)		PCB-66	(6.48)	
PCB-4	(18.1)		PCB-23	(11.2)		PCB-69/49	(9.46)	C	PCB-55	(6.36)	
PCB-10	(12.8)		PCB-26/29	(11.2)	C	PCB-48	(11.4)		PCB-56	(6.64)	
PCB-9	(31)		PCB-25	(10.8)		PCB-44/47/65	(10.4)	C	PCB-60	(6.35)	
PCB-7	(27.3)		PCB-31	(10.3)		PCB-59/62/75	(8.1)	C	PCB-80	(5.55)	
PCB-6	(29.2)		PCB-28/20	(11.1)	C	PCB-42	(12.5)		PCB-79	(5.13)	
PCB-5	(29.1)		PCB-21/33	(10.7)	C	PCB-41	(13.5)		PCB-78	(6.82)	
PCB-8	(27.7)		PCB-22	(11.7)		PCB-71/40	(11.3)	C	PCB-81	(6.7)	
PCB-14	(24)		PCB-36	(10.9)		PCB-64	(7.7)		PCB-77	(8.14)	
PCB-11	(28.4)		PCB-39	(10.2)							
PCB-13/12	(27.4)	C	PCB-38	(11)							
PCB-15	(28.3)		PCB-35	(11.7)							
			PCB-37	(10.9)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	0		**EMPC**	0					**EMPC**	6	

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Totals	Conc.	EMPC
Mono-Tri	0	0
Tetra-Hexa	29.1	71.8
Hepta-Deca	0	0
Mono-Deca	29.1	71.8

Sample ID: Seep-S-14

Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(8.35)		PCB-108/119/86/97/125/87	(8.49)	C	PCB-155	(8.48)		PCB-165	(7.23)	
PCB-96	(10.4)		PCB-117	(7.5)		PCB-152	(8.88)		PCB-146	(8.49)	
PCB-103	(9.56)		PCB-116/85	(9.22)	C	PCB-150	(9.06)		PCB-161	(6.46)	
PCB-94	(11)		PCB-110	20.2		PCB-136	(10)		PCB-153/168	8.94	J C
PCB-95	(10)		PCB-115	(7.76)		PCB-145	(9.48)		PCB-141	(8.8)	
PCB-100/93	(9.74)	C	PCB-82	(11.8)		PCB-148	(8.52)		PCB-130	(10.4)	
PCB-102	(9.4)		PCB-111	(6.92)		PCB-151/135	(8.95)	C	PCB-137	(8.15)	
PCB-98	(10.8)		PCB-120	(7.27)		PCB-154	(7.7)		PCB-164	(7.36)	
PCB-88	(10.3)		PCB-107/124	(7.86)	C	PCB-144	(8.65)		PCB-163/138/129	[14.8]	J EMPC C
PCB-91	(9.74)		PCB-109	(7.22)		PCB-147/149	[13.9]	J EMPC C	PCB-160	(7.43)	
PCB-84	(12.1)		PCB-123	(7.71)		PCB-134	(12.1)		PCB-158	(6.43)	
PCB-89	(11.1)		PCB-106	(8.03)		PCB-143	(8.49)		PCB-128/166	(9.82)	C
PCB-121	(7.37)		PCB-118	(7.62)		PCB-139/140	(8.51)	C	PCB-159	(8.5)	
PCB-92	(10.8)		PCB-122	(8.67)		PCB-131	(9.79)		PCB-162	(8.73)	
PCB-113/90/101	[8.03]	J EMPC C	PCB-114	(7.72)		PCB-142	(10)		PCB-167	(9.65)	
PCB-83	(13.1)		PCB-105	(8.27)		PCB-132	(9.65)		PCB-156/157	(12.2)	C
PCB-99	(8.85)		PCB-127	(8.13)		PCB-133	(8.81)		PCB-169	(10.3)	
PCB-112	(7.74)		PCB-126	(7.72)							
			Conc.	20.2					**Conc.**	8.94	
			EMPC	28.2					**EMPC**	37.6	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(5.13)		PCB-174	(6.8)		PCB-202	(5.83)		PCB-208	(9.84)	
PCB-179	(6.31)		PCB-177	(6.74)		PCB-201	(6.08)		PCB-207	(9.42)	
PCB-184	(6.47)		PCB-181	(5.86)		PCB-204	(6.44)		PCB-206	(24.8)	
PCB-176	(5.82)		PCB-171/173	(6.84)	C	PCB-197	(5.92)				
PCB-186	(6.27)		PCB-172	(6.45)		PCB-200	(6.34)		**Conc.**	0	
PCB-178	(8.65)		PCB-192	(5.05)		PCB-198/199	(8.69)	C	**EMPC**	0	
PCB-175	(6.04)		PCB-180/193	(5.26)	C	PCB-196	(8.66)				
PCB-187	(5.52)		PCB-191	(4.81)		PCB-203	(8.4)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(5.44)		PCB-170	(7.63)		PCB-195	(17.5)		PCB-209	(20.1)	
PCB-183	(5.46)		PCB-190	(5.2)		PCB-194	(16.2)				
PCB-185	(5.64)		PCB-189	(8.38)		PCB-205	(13.3)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

Sample ID: Seep-S-16

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.92 L	Sample ID:	B2267_15900_PCB_007-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	7	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	13.2			ES PCB-1	30.6
PCB-81 344'5-TeCB	ND	15			ES PCB-3	38.2
PCB-105 233'44'-PeCB	36.2				ES PCB-4	35.6
PCB-114 2344'5-PeCB	ND	12.5			ES PCB-15	56.9
PCB-118 23'44'5-PeCB	138				ES PCB-19	39.6
PCB-123 23'44'5'-PeCB	ND	10.6			ES PCB-37	66.8
PCB-126 33'44'5-PeCB	ND	15.1			ES PCB-54	48.5
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	22		C	ES PCB-77	67.4
PCB-167 23'44'55'-HxCB	ND	17.2			ES PCB-81	70.3
PCB-169 33'44'55'-HxCB	ND	23			ES PCB-104	63.3
PCB-189 233'44'55'-HpCB	ND	16.2			ES PCB-105	59
					ES PCB-114	55.8
TEQs (WHO 2005 M/H)					ES PCB-118	60.7
					ES PCB-123	64.5
ND = 0	0.00523		0.00523		ES PCB-126	47
ND = 0.5 x DL	1.11		1.11		ES PCB-153	57
ND = DL	2.21		2.21		ES PCB-155	61.6
					ES PCB-156/157	35.7
Totals					ES PCB-167	36.2
Mono-CB	141				ES PCB-169	27.4
Di-CB	1,120				ES PCB-170	36.6
Tri-CB	6,500		7,610		ES PCB-180	38.6
Tetra-CB	4,580		4,660		ES PCB-188	73.1
Penta-CB	1,490		1,770		ES PCB-189	31.8
Hexa-CB	458		640		ES PCB-202	52.2
Hepta-CB	72.2		192		ES PCB-205	35.3
Octa-CB	37.3		46.3		ES PCB-206	34.4
Nona-CB	ND	35.3			ES PCB-208	40.1
Deca-CB	ND	54.6			ES PCB-209	41.1
					CS PCB-28	69.8
Total PCB (Mono-Deca)	14,400		16,200		CS PCB-111	90.3
					CS PCB-178	102

Checkcode: 542-320-BGN/A   SGS North America - PCB v0.82   Report Created: 12-Jun-2018 09:30   Analyst: as

Sample ID: Seep-S-16

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	17-May-2018
Project ID:	Nord Door	Weight/Volume:	0.92 L	Sample ID:	B2267_15900_PCB_007-R1	Date Extracted:	30-May-2018
Date Collected:	14-May-2018	pH	7	QC Batch No.:	15900	Date Analyzed:	09-Jun-2018
		Units	pg/L	Checkcode:	542-320-BGN/A	Time Analyzed:	02:53:37

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	141		PCB-19	[1,070]	EMPC	PCB-54	84.1		PCB-72	(13.4)	
PCB-2	(11.2)		PCB-30/18	1,860	C	PCB-50/53	752	C	PCB-68	(11.9)	
PCB-3	(10.8)		PCB-17	775		PCB-45	[35.4]	EMPC	PCB-57	(14.2)	
			PCB-27	1,150		PCB-51	203		PCB-58	(13.5)	
Conc.	141		PCB-24	(26.8)		PCB-46	69.5		PCB-67	(12.8)	
EMPC	141		PCB-16	75.6		PCB-52	1,570		PCB-63	(12.5)	
			PCB-32	984		PCB-73	(12.2)		PCB-61/70/74/76	188	C
Di	**Conc.**	**Qualifiers**	PCB-34	(22)		PCB-43	(18.4)		PCB-66	120	
PCB-4	518		PCB-23	(20.9)		PCB-69/49	639	C	PCB-55	(14.2)	
PCB-10	(27.4)		PCB-26/29	845	C	PCB-48	(16.1)		PCB-56	[23.6]	EMPC
PCB-9	(31.1)		PCB-25	417		PCB-44/47/65	482	C	PCB-60	(14.2)	
PCB-7	19.1		PCB-31	206		PCB-59/62/75	[23.3]	J EMPC C	PCB-80	(12.4)	
PCB-6	396		PCB-28/20	162	C	PCB-42	74.7		PCB-79	(11.5)	
PCB-5	(29.1)		PCB-21/33	[38.4]	EMPC C	PCB-41	(19.1)		PCB-78	(15.2)	
PCB-8	139		PCB-22	19.6		PCB-71/40	310	C	PCB-81	(15)	
PCB-14	(24.1)		PCB-36	(20.3)		PCB-64	81.7		PCB-77	(13.2)	
PCB-11	50.4		PCB-39	(19.1)							
PCB-13/12	(27.5)	C	PCB-38	(20.5)							
PCB-15	(28.4)		PCB-35	(21.8)							
			PCB-37	(20.3)							
Conc.	1,120		**Conc.**	6,500					**Conc.**	4,580	
EMPC	1,120		**EMPC**	7,610					**EMPC**	4,660	

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Totals	**Conc.**	**EMPC**
Mono-Tri	7,760	8,870
Tetra-Hexa	6,520	7,070
Hepta-Deca	109	239
Mono-Deca	14,400	16,200

Sample ID: Seep-S-16

Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(8.56)		PCB-108/119/86/97/125/87	[116]	EMPC C	PCB-155	(7.43)		PCB-165	(8.38)	
PCB-96	(10.6)		PCB-117	(10.3)		PCB-152	(7.78)		PCB-146	[31.1]	EMPC
PCB-103	17.1		PCB-116/85	30.6	C	PCB-150	(7.94)		PCB-161	(7.5)	
PCB-94	(15.2)		PCB-110	333		PCB-136	29.5		PCB-153/168	146	C
PCB-95	413		PCB-115	(10.7)		PCB-145	(8.31)		PCB-141	19.2	
PCB-100/93	(13.4)	C	PCB-82	[16.7]	EMPC	PCB-148	(9.88)		PCB-130	(12)	
PCB-102	(13)		PCB-111	(9.56)		PCB-151/135	66.2	C	PCB-137	(9.46)	
PCB-98	(14.9)		PCB-120	(10)		PCB-154	(8.93)		PCB-164	(8.54)	
PCB-88	(14.2)		PCB-107/124	(10.8)	C	PCB-144	(10)		PCB-163/138/129	136	C
PCB-91	[46.6]	EMPC	PCB-109	(9.96)		PCB-147/149	[135]	EMPC C	PCB-160	(8.62)	
PCB-84	[103]	EMPC	PCB-123	(10.6)		PCB-134	(14.1)		PCB-158	(7.46)	
PCB-89	(15.4)		PCB-106	(11.1)		PCB-143	(9.85)		PCB-128/166	[16.2]	J EMPC C
PCB-121	(10.2)		PCB-118	138		PCB-139/140	(9.87)	C	PCB-159	(15.2)	
PCB-92	82.8		PCB-122	(14.1)		PCB-131	(11.4)		PCB-162	(15.6)	
PCB-113/90/101	296	C	PCB-114	(12.5)		PCB-142	(11.6)		PCB-167	(17.2)	
PCB-83	(18)		PCB-105	36.2		PCB-132	61.6		PCB-156/157	(22)	C
PCB-99	139		PCB-127	(13.1)		PCB-133	(10.2)		PCB-169	(23)	
PCB-112	(10.7)		PCB-126	(15.1)							
			Conc.	1,490					**Conc.**	458	
			EMPC	1,770					**EMPC**	640	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(6.85)		PCB-174	[25.2]	EMPC	PCB-202	[9.06]	J EMPC	PCB-208	(24.3)	
PCB-179	[23.6]	EMPC	PCB-177	(17.1)		PCB-201	(7.7)		PCB-207	(23.3)	
PCB-184	(8.63)		PCB-181	(14.9)		PCB-204	(8.15)		PCB-206	(46.3)	
PCB-176	(7.78)		PCB-171/173	(17.4)	C	PCB-197	(7.49)				
PCB-186	(8.37)		PCB-172	(16.4)		PCB-200	(8.02)		**Conc.**	0	
PCB-178	(11.5)		PCB-192	(12.8)		PCB-198/199	26.3	C	**EMPC**	0	
PCB-175	(15.4)		PCB-180/193	[71.2]	EMPC C	PCB-196	11				
PCB-187	72.2		PCB-191	(12.2)		PCB-203	(10.6)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(13.8)		PCB-170	(14.4)		PCB-195	(41.8)		PCB-209	(54.6)	
PCB-183	(13.9)		PCB-190	(9.81)		PCB-194	(38.6)				
PCB-185	(14.3)		PCB-189	(16.2)		PCB-205	(31.7)				
			Conc.	72.2		**Conc.**	37.3				
			EMPC	192		**EMPC**	46.3				

Sample ID: Method Blank B2267_15900 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	2.00 L	Sample ID:	MB1_15900_PCB_TLX	Date Extracted:	30-May-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	15900	Date Analyzed:	08-Jun-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	4.79			ES PCB-1	64.6
PCB-81 344'5-TeCB	ND	5.07			ES PCB-3	71.1
PCB-105 233'44'-PeCB	ND	6.07			ES PCB-4	74.4
PCB-114 2344'5-PeCB	ND	6.53			ES PCB-15	86.4
PCB-118 23'44'5-PeCB	ND	6.97			ES PCB-19	77
PCB-123 23'44'5'-PeCB	ND	5.48			ES PCB-37	86
PCB-126 33'44'5-PeCB	ND	5.5			ES PCB-54	80.9
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	7.7		C	ES PCB-77	102
PCB-167 23'44'55'-HxCB	ND	5.85			ES PCB-81	94.1
PCB-169 33'44'55'-HxCB	ND	7.33			ES PCB-104	84.6
PCB-189 233'44'55'-HpCB	ND	3.98			ES PCB-105	99.5
					ES PCB-114	85.1
TEQs (WHO 2005 M/H)					ES PCB-118	99
					ES PCB-123	100
ND = 0	0		0		ES PCB-126	99
ND = 0.5 x DL	0.386		0.386		ES PCB-153	83.4
ND = DL	0.773		0.773		ES PCB-155	76.4
					ES PCB-156/157	85.7
Totals					ES PCB-167	84.1
Mono-CB	ND	4			ES PCB-169	76.4
Di-CB	ND	10.6			ES PCB-170	76.9
Tri-CB	ND	9.54			ES PCB-180	80.5
Tetra-CB	ND	5.53			ES PCB-188	97.1
Penta-CB	ND	5.92			ES PCB-189	89.7
Hexa-CB	ND	6.6			ES PCB-202	107
Hepta-CB	ND	5.4			ES PCB-205	96.3
Octa-CB	ND	6.09			ES PCB-206	99.1
Nona-CB	ND	10.3			ES PCB-208	85.8
Deca-CB	ND	9.51			ES PCB-209	121
					CS PCB-28	54.8
Total PCB (Mono-Deca)	0		0		CS PCB-111	73.6
					CS PCB-178	87.5

Checkcode: 845-611-WMD/A SGS North America - PCB v0.82 Report Created: 12-Jun-2018 09:22 Analyst: as

Sample ID: Method Blank B2267_15900

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2267	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	2.00 L	Sample ID:	MB1_15900_PCB_TLX	Date Extracted:	30-May-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	15900	Date Analyzed:	08-Jun-2018
		Units	pg/L	Checkcode:	845-611-WMD/A	Time Analyzed:	22:55:34

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(3.98)		PCB-19	(12.1)		PCB-54	(6.15)		PCB-72	(4.54)	
PCB-2	(4.16)		PCB-30/18	(9.42)	C	PCB-50/53	(5.77)	C	PCB-68	(4.03)	
PCB-3	(4.02)		PCB-17	(10.9)		PCB-45	(6.63)		PCB-57	(4.79)	
			PCB-27	(8.13)		PCB-51	(5.58)		PCB-58	(4.57)	
Conc.	0		PCB-24	(8.23)		PCB-46	(7.07)		PCB-67	(4.34)	
EMPC	0		PCB-16	(13.8)		PCB-52	(5.88)		PCB-63	(4.23)	
			PCB-32	(7.47)		PCB-73	(4.41)		PCB-61/70/74/76	(4.48)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(7.58)		PCB-43	(6.64)		PCB-66	(4.9)	
PCB-4	(8.47)		PCB-23	(7.21)		PCB-69/49	(4.85)	C	PCB-55	(4.81)	
PCB-10	(5.97)		PCB-26/29	(7.22)	C	PCB-48	(5.83)		PCB-56	(5.03)	
PCB-9	(13.9)		PCB-25	(6.93)		PCB-44/47/65	(5.33)	C	PCB-60	(4.81)	
PCB-7	(12.2)		PCB-31	(6.62)		PCB-59/62/75	(4.15)	C	PCB-80	(4.21)	
PCB-6	(13.1)		PCB-28/20	(7.12)	C	PCB-42	(6.4)		PCB-79	(3.88)	
PCB-5	(13)		PCB-21/33	(6.86)	C	PCB-41	(6.92)		PCB-78	(5.16)	
PCB-8	(12.4)		PCB-22	(7.51)		PCB-71/40	(5.8)	C	PCB-81	(5.07)	
PCB-14	(10.8)		PCB-36	(6.99)		PCB-64	(3.95)		PCB-77	(4.79)	
PCB-11	(12.7)		PCB-39	(6.58)							
PCB-13/12	(12.3)	C	PCB-38	(7.07)							
PCB-15	(12.7)		PCB-35	(7.52)							
			PCB-37	(6.99)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	0		**EMPC**	0					**EMPC**	0	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	**Conc.**	**EMPC**
Mono-Tri	0	0
Tetra-Hexa	0	0
Hepta-Deca	0	0
Mono-Deca	0	0

Sample ID: Method Blank B2267_15900 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(5)		PCB-108/119/86/97/125/87	(6.04)	C	PCB-155	(5.52)		PCB-165	(6.51)	
PCB-96	(6.22)		PCB-117	(5.33)		PCB-152	(5.78)		PCB-146	(7.64)	
PCB-103	(6.79)		PCB-116/85	(6.55)	C	PCB-150	(5.9)		PCB-161	(5.82)	
PCB-94	(7.81)		PCB-110	(5.43)		PCB-136	(6.52)		PCB-153/168	(6.06)	C
PCB-95	(7.13)		PCB-115	(5.51)		PCB-145	(6.18)		PCB-141	(7.93)	
PCB-100/93	(6.92)	C	PCB-82	(8.4)		PCB-148	(7.67)		PCB-130	(9.35)	
PCB-102	(6.68)		PCB-111	(4.92)		PCB-151/135	(8.06)	C	PCB-137	(7.34)	
PCB-98	(7.67)		PCB-120	(5.17)		PCB-154	(6.94)		PCB-164	(6.63)	
PCB-88	(7.31)		PCB-107/124	(5.59)	C	PCB-144	(7.79)		PCB-163/138/129	(7.62)	C
PCB-91	(6.92)		PCB-109	(5.13)		PCB-147/149	(7.86)	C	PCB-160	(6.69)	
PCB-84	(8.58)		PCB-123	(5.48)		PCB-134	(10.9)		PCB-158	(5.79)	
PCB-89	(7.92)		PCB-106	(5.71)		PCB-143	(7.65)		PCB-128/166	(5.96)	C
PCB-121	(5.24)		PCB-118	(6.97)		PCB-139/140	(7.66)	C	PCB-159	(5.16)	
PCB-92	(7.7)		PCB-122	(7.34)		PCB-131	(8.82)		PCB-162	(5.3)	
PCB-113/90/101	(6.13)	C	PCB-114	(6.53)		PCB-142	(9.01)		PCB-167	(5.85)	
PCB-83	(9.29)		PCB-105	(6.07)		PCB-132	(8.69)		PCB-156/157	(7.7)	C
PCB-99	(6.29)		PCB-127	(5.97)		PCB-133	(7.94)		PCB-169	(7.33)	
PCB-112	(5.5)		PCB-126	(5.5)							
			Conc.	0					**Conc.**	0	
			EMPC	0					**EMPC**	0	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(4.45)		PCB-174	(7.17)		PCB-202	(3.97)		PCB-208	(7.47)	
PCB-179	(5.47)		PCB-177	(7.11)		PCB-201	(4.14)		PCB-207	(7.15)	
PCB-184	(5.6)		PCB-181	(6.18)		PCB-204	(4.38)		PCB-206	(13.1)	
PCB-176	(5.05)		PCB-171/173	(7.21)	C	PCB-197	(4.03)				
PCB-186	(5.43)		PCB-172	(6.8)		PCB-200	(4.31)		**Conc.**	0	
PCB-178	(7.5)		PCB-192	(5.32)		PCB-198/199	(5.91)	C	**EMPC**	0	
PCB-175	(6.37)		PCB-180/193	(5.55)	C	PCB-196	(5.89)				
PCB-187	(5.83)		PCB-191	(5.08)		PCB-203	(5.71)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(5.74)		PCB-170	(8.27)		PCB-195	(10.8)		PCB-209	(9.51)	
PCB-183	(5.75)		PCB-190	(5.64)		PCB-194	(10)				
PCB-185	(5.95)		PCB-189	(3.98)		PCB-205	(8.21)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM7_PCB_06072017_03MAR2018		
Instrument ID:	MM7	GC Column ID:	
VER Data Filename:	180608X16	Analysis Date:	08-JUN-2018 21:56:03
Lab ID:	OPR1_15900_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	115	50	-	150	Y
PCB-3 4-MoCB	50	113	50	-	150	Y
PCB-4 22'-DiCB	50	97	50	-	150	Y
PCB-15 44'-DiCB	50	119	50	-	150	Y
PCB-19 22'6-TrCB	50	106	50	-	150	Y
PCB-37 344'-TrCB	50	112	50	-	150	Y
PCB-54 22'66'-TeCB	50	91.9	50	-	150	Y
PCB-77 33'44'-TeCB	50	119	50	-	150	Y
PCB-81 344'5-TeCB	50	118	50	-	150	Y
PCB-104 22'466'-PeCB	50	95.9	50	-	150	Y
PCB-105 233'44'-PeCB	50	114	50	-	150	Y
PCB-114 2344'5-PeCB	50	121	50	-	150	Y
PCB-118 23'44'5-PeCB	50	114	50	-	150	Y
PCB-123 23'44'5'-PeCB	50	116	50	-	150	Y
PCB-126 33'44'5-PeCB	50	140	50	-	150	Y
PCB-155 22'44'66'-HxCB	50	119	50	-	150	Y
PCB-156/157 ...-HxCB	100	121	50	-	150	Y
PCB-167 23'44'55'-HxCB	50	136	50	-	150	Y
PCB-169 33'44'55'-HxCB	50	122	50	-	150	Y
PCB-188 22'34'566'-HpCB	50	98.4	50	-	150	Y
PCB-189 233'44'55'-HpCB	50	114	50	-	150	Y
PCB-202 22'33'55'66'-OcCB	50	91.8	50	-	150	Y
PCB-205 233'44'55'6-OcCB	50	113	50	-	150	Y
PCB-206 22'33'44'55'6-NoCB	50	107	50	-	150	Y
PCB-208 22'33'455'66'-NoCB	50	113	50	-	150	Y
PCB-209 DeCB	50	108	50	-	150	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668A.

Processed: 12 Jun 2018 09:21 Analyst: as

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM7_PCB_06072017_03MAR2018
Instrument ID: MM7 GC Column ID:
VER Data Filename: 180608X16 Analysis Date: 08-JUN-2018 21:56:03
Lab ID: OPR1_15900_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	63.1	15	-	140	Y
ES PCB-3	100	75	15	-	140	Y
ES PCB-4	100	79.8	30	-	140	Y
ES PCB-15	100	107	30	-	140	Y
ES PCB-19	100	94.6	30	-	140	Y
ES PCB-37	100	103	30	-	140	Y
ES PCB-54	100	97.9	30	-	140	Y
ES PCB-77	100	125	30	-	140	Y
ES PCB-81	100	120	30	-	140	Y
ES PCB-104	100	118	30	-	140	Y
ES PCB-105	100	121	30	-	140	Y
ES PCB-114	100	110	30	-	140	Y
ES PCB-118	100	121	30	-	140	Y
ES PCB-123	100	111	30	-	140	Y
ES PCB-126	100	113	30	-	140	Y
ES PCB-153	100	97	30	-	140	Y
ES PCB-155	100	81.4	30	-	140	Y
ES PCB-156/157	200	85	30	-	140	Y
ES PCB-167	100	77.1	30	-	140	Y
ES PCB-169	100	86.9	30	-	140	Y
ES PCB-170	100	90.6	30	-	140	Y
ES PCB-180	100	96.8	30	-	140	Y
ES PCB-188	100	117	30	-	140	Y
ES PCB-189	100	100	30	-	140	Y
ES PCB-202	100	112	30	-	140	Y
ES PCB-205	100	107	30	-	140	Y
ES PCB-206	100	107	30	-	140	Y
ES PCB-208	100	103	30	-	140	Y
ES PCB-209	100	130	30	-	140	Y
CLEANUP STANDARDS						
CS PCB-28	100	86.5	40	-	125	Y
CS PCB-111	100	102	40	-	125	Y
CS PCB-178	100	115	40	-	125	Y

Processed: 12 Jun 2018 09:21 Analyst: as

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager: *Amy Boehm*
Receipt Date & Time: *17-May-18 at 09:56*
AP Project name: *B2267*
Requested TAT: *21 days*
Projected due date: *7-Jun-18*
Matrix: *Aqueous*
Phone#: *910-794-1613*
Email Address: *Amy.Boehm@sgs.com*

Company Contact: *Chris Kramer*
Company: *SLR International Corp*
Project Name & Site: *Nord Door*
Project PO#: *108.00228.00048*
QAAP/Contract #: *N/A*
Requested Analysis: *Method 8290A & 1668A*
Phone#: *503-723-4423*
Email Address: *ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
Seep-N-2	B2267_001	Water - D/F	2	1-Liter Amber	15-May-18	14:08	1.1	1	7810 0249 2100
Seep-N-14	B2267_002	Water - D/F	2	1-Liter Amber	15-May-18	13:21	1.1	1	7810 0249 2100
Seep-N-18	B2267_003	Water - D/F	2	1-Liter Amber	15-May-18	12:55	1.1, 0.4	1, 2	7810 0249 2100,7810 0249 2111,
Seep-S-1	B2267_004	Water - D/F & PCB	2	1-Liter Amber	14-May-18	14:55	1.1, 0.4	1, 2	7810 0249 2100,7810 0249 2111,
Seep-S-9	B2267_005	Water - PCB	2	1-Liter Amber	14-May-18	12:48	1.1, 0.4	1, 2	7810 0249 2100,7810 0249 2111,
Seep-S-14	B2267_006	Water - D/F & PCB	2	1-Liter Amber	15-May-18	12:14	0.4	2	7810 0249 2111
Seep-S-16	B2267_007	Water - D/F & PCB	2	1-Liter Amber	14-May-18	13:42	0.4	2	7810 0249 2111
Duplicate-0518	B2267_008	Water - HOLD	2	1-Liter Amber	14-May-18	14:12	0.4	2	7810 0249 2111
Field-0518	B2267_009	Water - HOLD	2	1-Liter Amber	15-May-18	14:35	1.1	1	7810 0249 2100

Preservation Type:
Sample Seals: No

Notes/Comments:

Samples received intact.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens
Logged in by: Ashley Owens
QC'ed by: AK 17 May 18

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B2267

SGS CHAIN OF CUSTODY

PROJECT INFO

PROJECT: Nord Door
P.O. #: 108.00228.00048
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

> Hold Duplicate-0518 and Field-0518

SEND DOCUMENTATION / RESULTS TO

COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd, Ste 440
West Linn, OR 97068
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.co
smiller@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)

COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

PRESERVATIVE

ANALYSIS & METHOD

	SAMPLE ID / DESCRIPTION	DATE	TIME	QTY	MATRIX	Dioxins/Furans	PCB Congeners	MS MSD	MS/DUP	REMARKS
001	Seep-N-2	5/15/18	1408	2	water	X				
002	Seep-N-14	5/15/18	1321	↓	↓	X				
003	Seep-N-18	5/15/18	1255			X				
004	Seep-S-1	5/14/18	1455			X	X			
005	Seep-S-9	5/14/18	1248				X			
006	Seep-S-14	5/15/18	1214			X	X			
007	Seep-S-16	5/14/18	1342			X	X			
008	Duplicate-0518	5/14/18	1412			X	X			
009	Field-0518	5/15/18	1435			X	X			

	DATE:	TIME:	RECEIVED BY:
COLLECTED/RELINQUISHED BY (1):	5/16/18	1300	
RELINQUISHED BY (2):			
RELINQUISHED BY (3):			

RECEIVED BY LABORATORY: Ashley Owens DATE: 5/17/18 TIME: 9:56
COOLER SEAL: ☒ INTACT ☐ BROKEN ☐ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: FedEx TEMP: °C 1.1° / 0.4°
TRACKING #: 7810 0249 2100
7810 0249 2111

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
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This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value “H” is assigned. If the obtained value is less than half the specified value “h” is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'Xx' denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

PCB Report

Method 1668A

Analyte	Method Blank B2413_16007	Duplicate-0518
	pg/L	pg/L
PCB-77	(2)	(4.4)
PCB-81	(1.99)	(4.56)
PCB-105	(0.768)	185
PCB-114	(0.761)	[9.3]
PCB-118	0.99	482
PCB-123	(0.785)	[6.74]
PCB-126	(0.539)	(1.7)
PCB-156/157	(0.67)	127
PCB-167	(0.448)	[31.8]
PCB-169	(0.479)	(2.08)
PCB-189	(0.526)	[3.51]
Total Mono-CB	[5.4]	101
Total Di-CB	(3.04)	866
Total Tri-CB	[1.52]	5,840
Total Tetra-CB	(1.49)	3,410
Total Penta-CB	0.99	2,540
Total Hexa-CB	2.44	2,410
Total Hepta-CB	(0.492)	575
Total Octa-CB	(0.331)	115
Total Nona-CB	(3.85)	[27.7]
Total Deca-CB	(0.372)	5.05

TEQs (WHO 2005 M/H)		
ND = 0; EMPC = 0	0.0000297	0.0238
ND = 0; EMPC = EMPC	0.0000297	0.0254
ND = DL/2; EMPC = 0	0.0346	0.141
ND = DL/2; EMPC = EMPC	0.0346	0.142
ND = DL; EMPC = 0	0.0692	0.258
ND = DL; EMPC = EMPC	0.0692	0.259

Checkcode	620-854-FQD/A	749-648-HZY/A

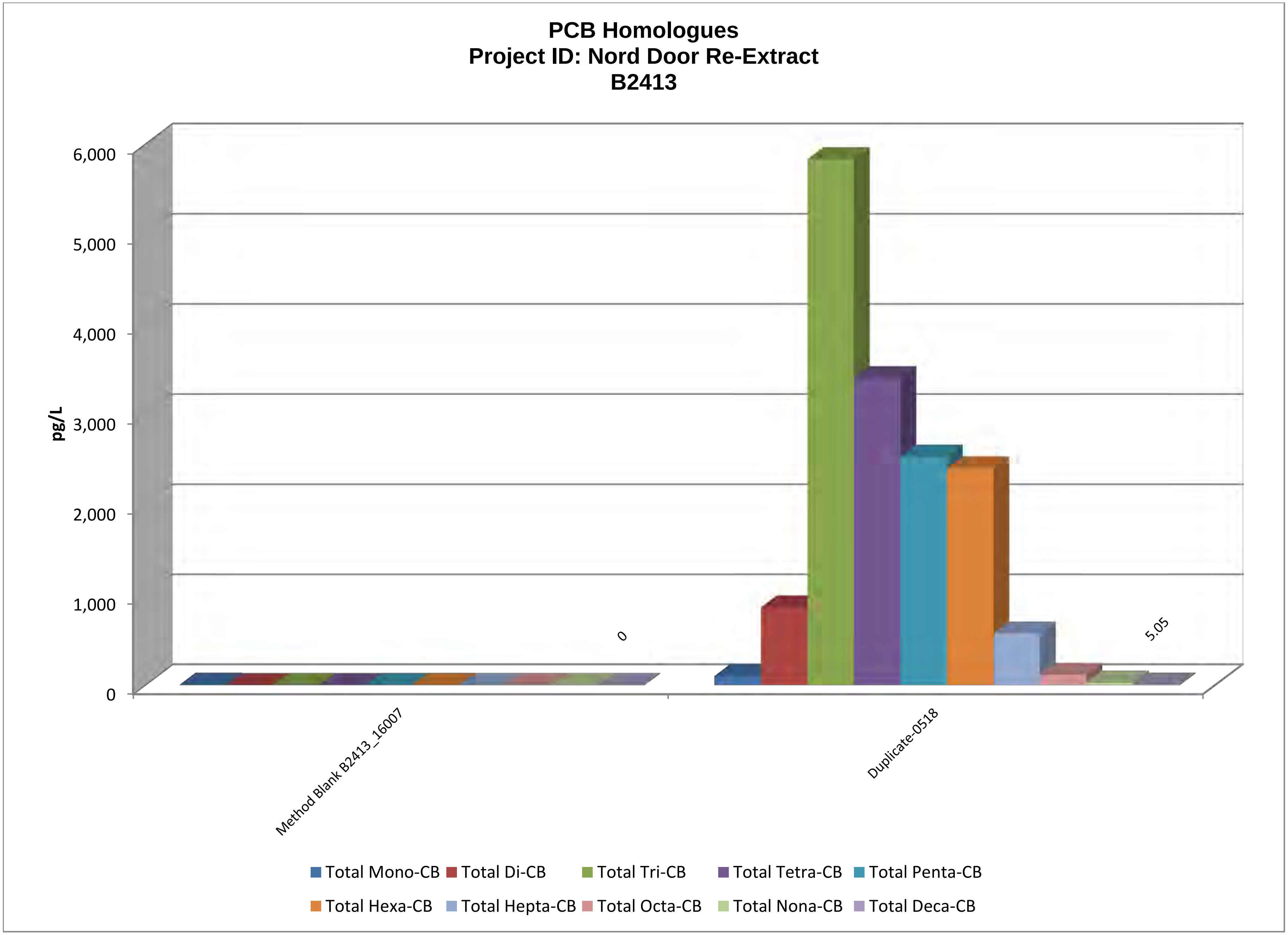
() = DL
[] = EMPC

PCB Recoveries

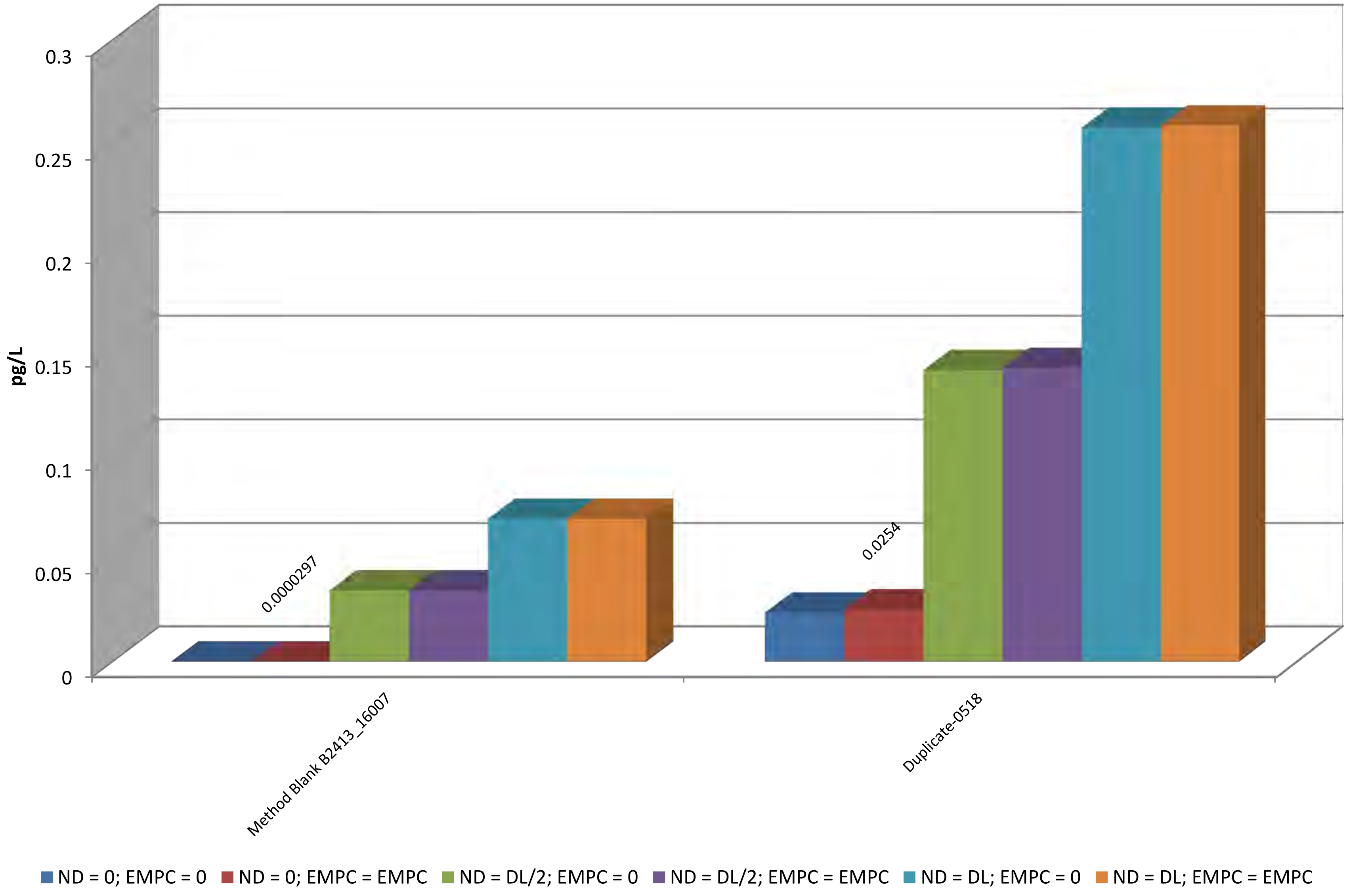
Method 1668A

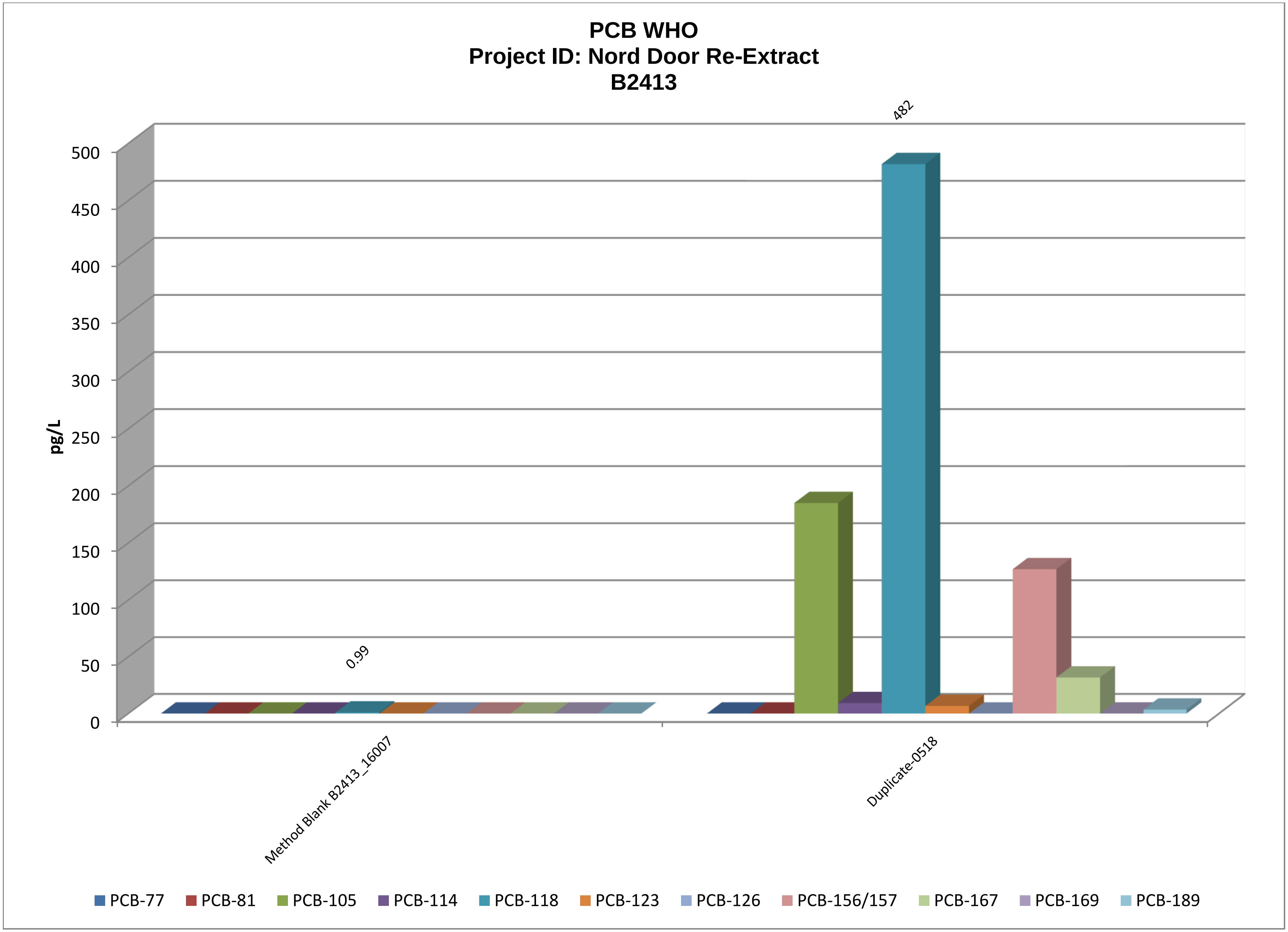
Standard	Method Blank B2413_16007	Duplicate-0518
ES PCB-1	98.9	65.1
ES PCB-3	97.1	69.2
ES PCB-4	119	84.2
ES PCB-15	90.5	89.5
ES PCB-19	120	89.9
ES PCB-39	73.4	80.3
ES PCB-54	91.3	79.3
ES PCB-77	101	101
ES PCB-81	99.5	101
ES PCB-104	109	88.2
ES PCB-105	128	118
ES PCB-114	120	115
ES PCB-118	122	115
ES PCB-123	127	116
ES PCB-126	117	111
ES PCB-153	95.5	96.8
ES PCB-155	83.1	75.3
ES PCB-156/157	95.6	88.6
ES PCB-167	94.4	86.8
ES PCB-169	100	80.8
ES PCB-170	102	97.6
ES PCB-180	104	101
ES PCB-188	93.6	90.3
ES PCB-189	93.9	76.5
ES PCB-202	99.5	91.8
ES PCB-205	104	72.8
ES PCB-206	102	69.7
ES PCB-208	103	89.2
ES PCB-209	103	63.9

Checkcode	620-854-FQD/A	749-648-HZY/A

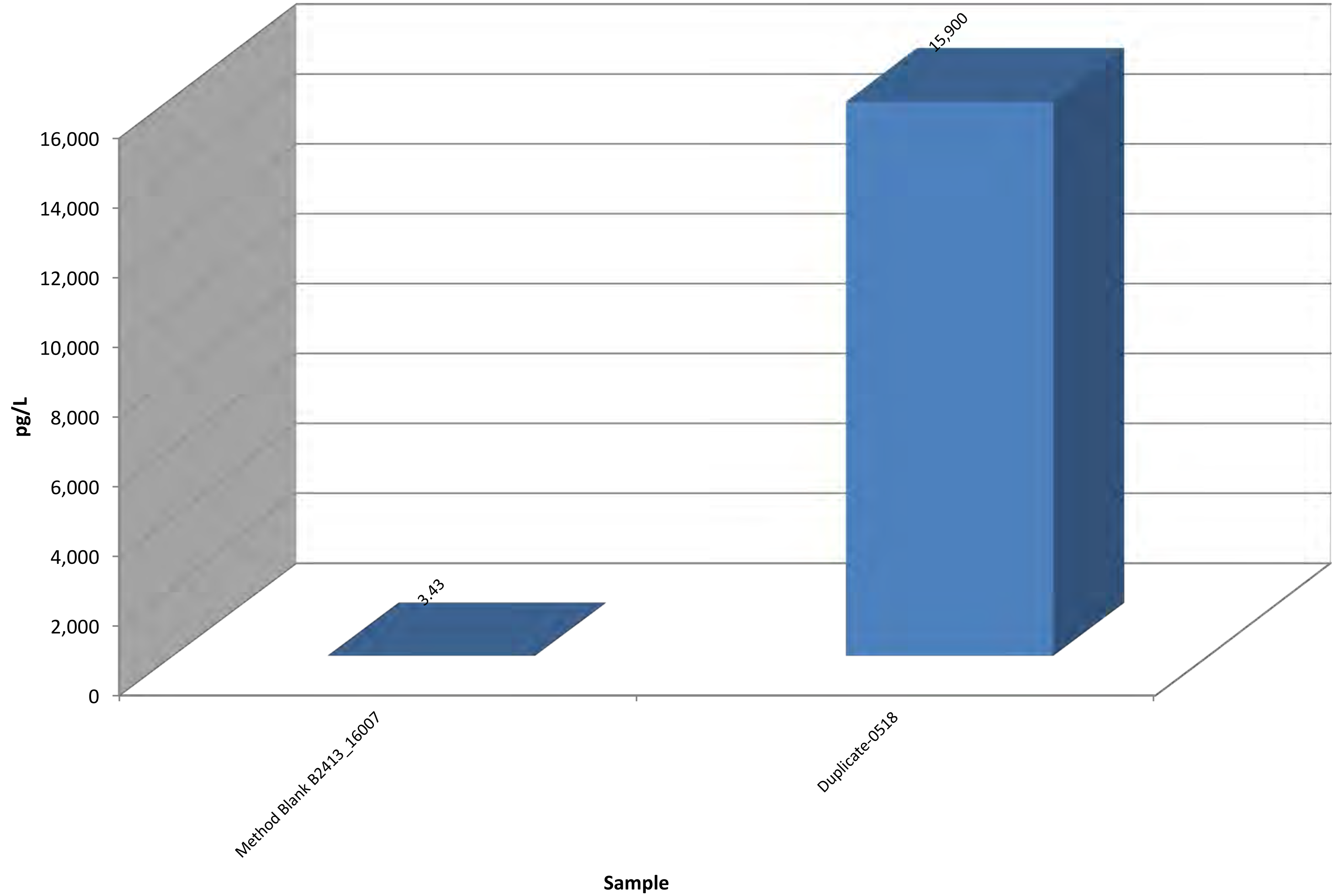

PCB Homologues
Project ID: Nord Door Re-Extract
B2413
pg/L
6,000
5,000
4,000
3,000
2,000
1,000
0
0
5.05
Method Blank B2413_16007
Duplicate-0518
Total Mono-CB
Total Di-CB
Total Tri-CB
Total Tetra-CB
Total Penta-CB
Total Hexa-CB
Total Hepta-CB
Total Octa-CB
Total Nona-CB
Total Deca-CB

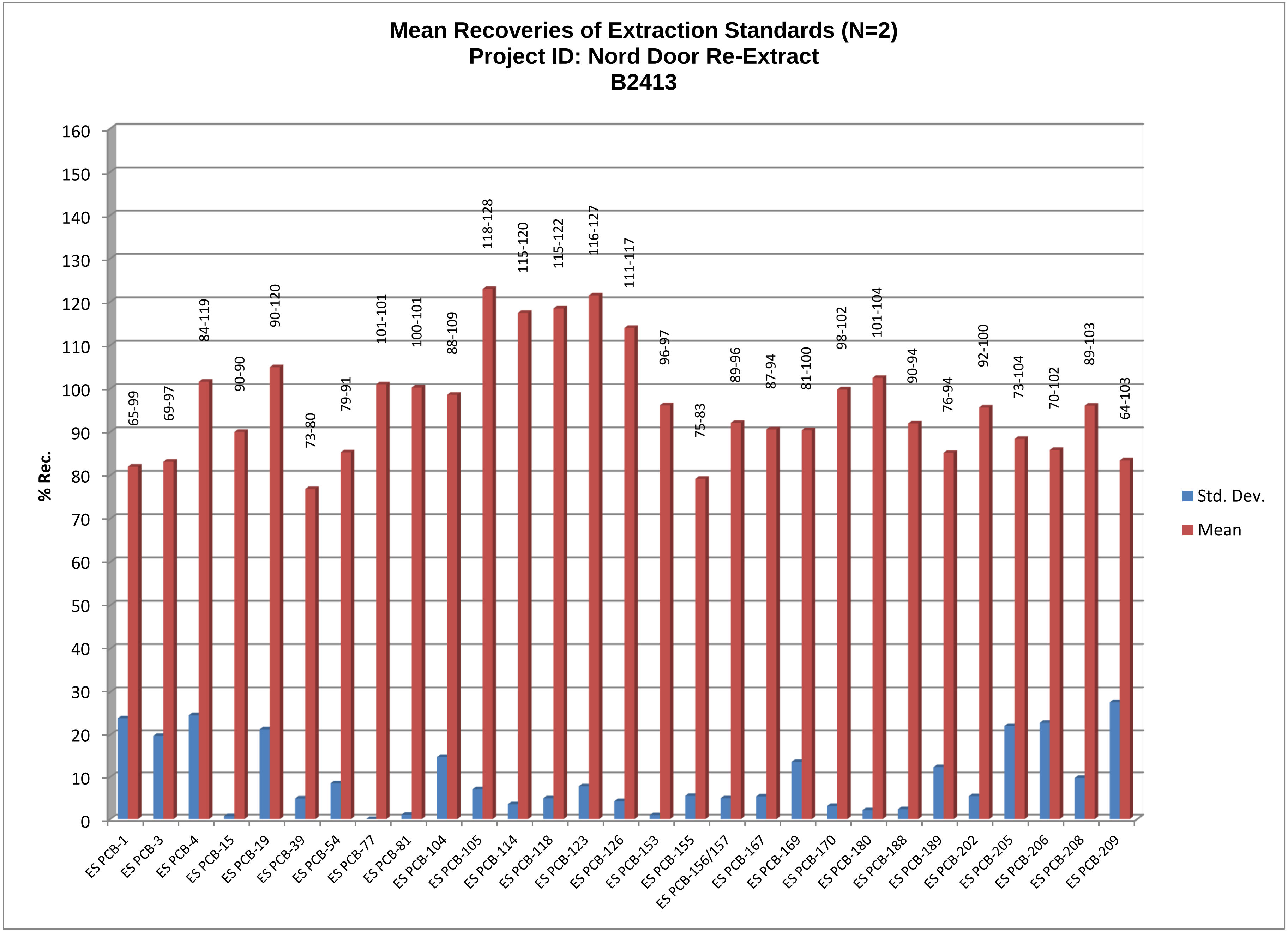
PCB TEQ
Project ID: Nord Door Re-Extract
B2413




PCB WHO
Project ID: Nord Door Re-Extract
B2413
pg/L
500
450
400
350
300
250
200
150
100
50
0
482
0.99
Method Blank B2413_16007
Duplicate-0518
PCB-77
PCB-81
PCB-105
PCB-114
PCB-118
PCB-123
PCB-126
PCB-156/157
PCB-167
PCB-169
PCB-189

Total PCBs
Project ID: Nord Door Re-Extract
B2413





Mean Recoveries of Extraction Standards (N=2)
Project ID: Nord Door Re-Extract
B2413

Sample ID: Duplicate-0518 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2413
Project ID:	Nord Door Re-Extract	Weight/Volume:	0.95 L	Sample ID:	B2413_16007_PCB_001
Date Collected:	14-May-2018	pH	8	QC Batch No.:	16007
				Date Received:	17-May-2018
				Date Extracted:	10-Jul-2018
				Date Analyzed:	16-Jul-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	4.4			ES PCB-1	65.1
PCB-81 344'5-TeCB	ND	4.56			ES PCB-3	69.2
PCB-105 233'44'-PeCB	185				ES PCB-4	84.2
PCB-114 2344'5-PeCB	EMPC		9.3	J	ES PCB-15	89.5
PCB-118 23'44'5-PeCB	482				ES PCB-19	89.9
PCB-123 23'44'5'-PeCB	EMPC		6.74	J	ES PCB-37	80.3
PCB-126 33'44'5-PeCB	ND	1.7			ES PCB-54	79.3
PCB-156/157 233'44'5/233'44'5'-HxCB	127			C	ES PCB-77	101
PCB-167 23'44'55'-HxCB	EMPC		31.8		ES PCB-81	101
PCB-169 33'44'55'-HxCB	ND	2.08			ES PCB-104	88.2
PCB-189 233'44'55'-HpCB	EMPC		3.51	J	ES PCB-105	118
					ES PCB-114	115
TEQs (WHO 2005 M/H)					ES PCB-118	115
					ES PCB-123	116
ND = 0	0.0238		0.0254		ES PCB-126	111
ND = 0.5 x DL	0.141		0.142		ES PCB-153	96.8
ND = DL	0.258		0.259		ES PCB-155	75.3
					ES PCB-156/157	88.6
Totals					ES PCB-167	86.8
Mono-CB	101		107		ES PCB-169	80.8
Di-CB	866		896		ES PCB-170	97.6
Tri-CB	5,840		5,840		ES PCB-180	101
Tetra-CB	3,410		3,450		ES PCB-188	90.3
Penta-CB	2,540		2,610		ES PCB-189	76.5
Hexa-CB	2,410		2,490		ES PCB-202	91.8
Hepta-CB	575		617		ES PCB-205	72.8
Octa-CB	115		136		ES PCB-206	69.7
Nona-CB			27.7		ES PCB-208	89.2
Deca-CB	5.05			J	ES PCB-209	63.9
					CS PCB-28	77.9
Total PCB (Mono-Deca)	15,900		16,200		CS PCB-111	116
					CS PCB-178	102

Checkcode: 749-648-HZY/A SGS North America - PCB v0.82 Report Created: 23-Jul-2018 12:43 Analyst: MC

Sample ID: Duplicate-0518

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2413
Project ID:	Nord Door Re-Extract	Weight/Volume:	0.95 L	Sample ID:	B2413_16007_PCB_001
Date Collected:	14-May-2018	pH	8	QC Batch No.:	16007
		Units	pg/L	Checkcode:	749-648-HZY/A

Date Received:	17-May-2018
Date Extracted:	10-Jul-2018
Date Analyzed:	16-Jul-2018
Time Analyzed:	20:43:23

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	96.2		PCB-19	879		PCB-54	62.5		PCB-72	(4.86)	
PCB-2	5.15	J	PCB-30/18	1,390	C	PCB-50/53	569	C	PCB-68	(4.39)	
PCB-3	[6.02]	J B EMPC	PCB-17	503		PCB-45	23.7		PCB-57	(5.07)	
			PCB-27	844		PCB-51	137		PCB-58	(4.96)	
Conc.	101		PCB-24	[8.51]	J EMPC	PCB-46	63.9		PCB-67	(4.72)	
EMPC	107		PCB-16	65.2		PCB-52	1,150		PCB-63	(4.5)	
			PCB-32	739		PCB-73	10.3	J	PCB-61/70/74/76	157	C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.67)		PCB-43	7.69	J	PCB-66	87.8	
PCB-4	389		PCB-23	(5.29)		PCB-69/49	461	C	PCB-55	(4.97)	
PCB-10	7.66	J	PCB-26/29	694	C	PCB-48	[15.6]	EMPC	PCB-56	[23]	EMPC
PCB-9	18.6		PCB-25	338		PCB-44/47/65	335	C	PCB-60	[4.43]	J EMPC
PCB-7	16.2		PCB-31	171		PCB-59/62/75	20.9	J C	PCB-80	(4.53)	
PCB-6	300		PCB-28/20	149	C	PCB-42	54.7		PCB-79	(4.49)	
PCB-5	(4.91)		PCB-21/33	36.9	C	PCB-41	(3.2)		PCB-78	(5.47)	
PCB-8	103		PCB-22	18		PCB-71/40	212	C	PCB-81	(4.56)	
PCB-14	(4.17)		PCB-36	(5.26)		PCB-64	53.9		PCB-77	(4.4)	
PCB-11	[30.3]	EMPC	PCB-39	(5.2)							
PCB-13/12	20	J C	PCB-38	(5.84)							
PCB-15	11.6		PCB-35	(6.04)							
			PCB-37	8.55	J						
Conc.	866		**Conc.**	5,840					**Conc.**	3,410	
EMPC	896		**EMPC**	5,840					**EMPC**	3,450	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	**Conc.**	**EMPC**
Mono-Tri	6,800	6,850
Tetra-Hexa	8,360	8,550
Hepta-Deca	695	785
Mono-Deca	15,900	16,200

Sample ID: Duplicate-0518 Method 1668A

Penta	**Conc.**	**Qualifiers**	**Penta**	**Conc.**	**Qualifiers**	**Hexa**	**Conc.**	**Qualifiers**	**Hexa**	**Conc.**	**Qualifiers**
PCB-104	(0.57)		PCB-108/119/86/97/125/87	210	C	PCB-155	(0.472)		PCB-165	(0.486)	
PCB-96	[4.55]	J EMPC	PCB-117	5.38	J	PCB-152	(0.503)		PCB-146	79.2	
PCB-103	10.8		PCB-116/85	48.8	C	PCB-150	(0.506)		PCB-161	(0.434)	
PCB-94	(2.39)		PCB-110	506		PCB-136	36.2		PCB-153/168	443	C
PCB-95	300		PCB-115	(1.67)		PCB-145	(0.532)		PCB-141	101	
PCB-100/93	5.91	J C	PCB-82	34.9		PCB-148	(0.553)		PCB-130	[43]	EMPC
PCB-102	[10.3]	J EMPC	PCB-111	(1.62)		PCB-151/135	101	C	PCB-137	44.9	
PCB-98	(2.3)		PCB-120	(1.65)		PCB-154	6.84	J	PCB-164	39.5	
PCB-88	(2.62)		PCB-107/124	[17.4]	J EMPC C	PCB-144	15		PCB-163/138/129	730	C
PCB-91	41		PCB-109	26.6		PCB-147/149	284	C	PCB-160	(0.454)	
PCB-84	86.2		PCB-123	[6.74]	J EMPC	PCB-134	21.4		PCB-158	75.6	
PCB-89	(2.47)		PCB-106	(1.73)		PCB-143	[1.58]	J EMPC	PCB-128/166	127	C
PCB-121	(1.66)		PCB-118	482		PCB-139/140	10.5	J C	PCB-159	3.38	J
PCB-92	69.5		PCB-122	[7.81]	J EMPC	PCB-131	[5.97]	J EMPC	PCB-162	3.5	J
PCB-113/90/101	354	C	PCB-114	[9.3]	J EMPC	PCB-142	(0.619)		PCB-167	[31.8]	EMPC
PCB-83	[12.6]	EMPC	PCB-105	185		PCB-132	152		PCB-156/157	127	C
PCB-99	175		PCB-127	(1.76)		PCB-133	7.27	J	PCB-169	(2.08)	
PCB-112	(1.73)		PCB-126	(1.7)							
			Conc.	2,540					**Conc.**	2,410	
			EMPC	2,610					**EMPC**	2,490	

Hepta	**Conc.**	**Qualifiers**	**Hepta**	**Conc.**	**Qualifiers**	**Octa**	**Conc.**	**Qualifiers**	**Nona**	**Conc.**	**Qualifiers**
PCB-188	(0.232)		PCB-174	75.2		PCB-202	11.2		PCB-208	[5.67]	J EMPC
PCB-179	21.5		PCB-177	41.5		PCB-201	[4.7]	J EMPC	PCB-207	(6.59)	
PCB-184	(0.266)		PCB-181	[0.896]	J EMPC	PCB-204	(0.581)		PCB-206	[22.1]	EMPC
PCB-176	[4.1]	J EMPC	PCB-171/173	[22.7]	EMPC C	PCB-197	(0.557)				
PCB-186	(0.249)		PCB-172	14.6		PCB-200	[3.92]	J EMPC	**Conc.**	0	
PCB-178	13.3		PCB-192	(0.711)		PCB-198/199	37.9	C	**EMPC**	27.7	
PCB-175	[2.47]	J EMPC	PCB-180/193	165	C	PCB-196	[12.1]	EMPC			
PCB-187	85.5		PCB-191	[3.13]	J EMPC	PCB-203	24.4		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.783)		PCB-170	101		PCB-195	11		PCB-209	5.05	J
PCB-183	38.6		PCB-190	18.7		PCB-194	30.5				
PCB-185	[4.78]	J EMPC	PCB-189	[3.51]	J EMPC	PCB-205	(1.32)				
			Conc.	575		**Conc.**	115				
			EMPC	617		**EMPC**	136				

Sample ID: Method Blank B2413_16007 Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2413	Date Received:	n/a
Project ID:	Nord Door Re-Extract	Weight/Volume:	2.00 L	Sample ID:	MB1_16007_PCB_TLX	Date Extracted:	10-Jul-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	16007	Date Analyzed:	16-Jul-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	2			ES PCB-1	98.9
PCB-81 344'5-TeCB	ND	1.99			ES PCB-3	97.1
PCB-105 233'44'-PeCB	ND	0.768			ES PCB-4	119
PCB-114 2344'5-PeCB	ND	0.761			ES PCB-15	90.5
PCB-118 23'44'5-PeCB	0.99			J	ES PCB-19	120
PCB-123 23'44'5'-PeCB	ND	0.785			ES PCB-37	73.4
PCB-126 33'44'5-PeCB	ND	0.539			ES PCB-54	91.3
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	0.67		C	ES PCB-77	101
PCB-167 23'44'55'-HxCB	ND	0.448			ES PCB-81	99.5
PCB-169 33'44'55'-HxCB	ND	0.479			ES PCB-104	109
PCB-189 233'44'55'-HpCB	ND	0.526			ES PCB-105	128
					ES PCB-114	120
TEQs (WHO 2005 M/H)					ES PCB-118	122
					ES PCB-123	127
ND = 0	0.0000297		0.0000297		ES PCB-126	117
ND = 0.5 x DL	0.0346		0.0346		ES PCB-153	95.5
ND = DL	0.0692		0.0692		ES PCB-155	83.1
					ES PCB-156/157	95.6
Totals					ES PCB-167	94.4
Mono-CB			5.4		ES PCB-169	100
Di-CB	ND	3.04			ES PCB-170	102
Tri-CB			1.52		ES PCB-180	104
Tetra-CB	ND	1.49			ES PCB-188	93.6
Penta-CB	0.99		2.56		ES PCB-189	93.9
Hexa-CB	2.44		3.96		ES PCB-202	99.5
Hepta-CB	ND	0.492			ES PCB-205	104
Octa-CB	ND	0.331			ES PCB-206	102
Nona-CB	ND	3.85			ES PCB-208	103
Deca-CB	ND	0.372			ES PCB-209	103
					CS PCB-28	74.9
Total PCB (Mono-Deca)	3.43		13.4		CS PCB-111	117
					CS PCB-178	99.5

Checkcode: 620-854-FQD/A SGS North America - PCB v0.82 Report Created: 23-Jul-2018 08:47 Analyst: MC

Sample ID: Method Blank B2413_16007 — Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2413	Date Received:	n/a
Project ID:	Nord Door Re-Extract	Weight/Volume:	2.00 L	Sample ID:	MB1_16007_PCB_TLX	Date Extracted:	10-Jul-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	16007	Date Analyzed:	16-Jul-2018
		Units	pg/L	Checkcode:	620-854-FQD/A	Time Analyzed:	17:50:04

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	[2.47]	J EMPC	PCB-19	(1.47)		PCB-54	(0.737)		PCB-72	(2.13)	
PCB-2	(1.15)		PCB-30/18	(1.23)	C	PCB-50/53	(1.29)	C	PCB-68	(1.92)	
PCB-3	[2.94]	J EMPC	PCB-17	(1.47)		PCB-45	(1.67)		PCB-57	(2.22)	
			PCB-27	(1.07)		PCB-51	(1.2)		PCB-58	(2.17)	
Conc.	0		PCB-24	(1.08)		PCB-46	(1.63)		PCB-67	(2.06)	
EMPC	5.4		PCB-16	(1.86)		PCB-52	(1.41)		PCB-63	(1.97)	
			PCB-32	(1.01)		PCB-73	(1.02)		PCB-61/70/74/76	(2.12)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(1.88)		PCB-43	(1.65)		PCB-66	(2.35)	
PCB-4	(3.15)		PCB-23	(1.76)		PCB-69/49	(1.14)	C	PCB-55	(2.17)	
PCB-10	(2.17)		PCB-26/29	(1.81)	C	PCB-48	(1.41)		PCB-56	(2.33)	
PCB-9	(4.05)		PCB-25	(1.73)		PCB-44/47/65	(1.31)	C	PCB-60	(2.22)	
PCB-7	(3.5)		PCB-31	(1.69)		PCB-59/62/75	(1.03)	C	PCB-80	(1.98)	
PCB-6	(3.67)		PCB-28/20	[1.52]	J EMPC C	PCB-42	(1.52)		PCB-79	(1.96)	
PCB-5	(3.64)		PCB-21/33	(1.77)	C	PCB-41	(1.85)		PCB-78	(2.39)	
PCB-8	(3.4)		PCB-22	(1.89)		PCB-71/40	(1.31)	C	PCB-81	(1.99)	
PCB-14	(3.09)		PCB-36	(1.75)		PCB-64	(0.955)		PCB-77	(2)	
PCB-11	(3.62)		PCB-39	(1.73)							
PCB-13/12	(3.57)	C	PCB-38	(1.94)							
PCB-15	(2.92)		PCB-35	(2.01)							
			PCB-37	(1.73)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	0		**EMPC**	1.52					**EMPC**	0	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	Conc.	EMPC
Mono-Tri	0	6.92
Tetra-Hexa	3.43	6.51
Hepta-Deca	0	0
Mono-Deca	3.43	13.4

Sample ID: Method Blank B2413_16007 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.359)		PCB-108/119/86/97/125/87	(0.916)	C	PCB-155	(0.607)		PCB-165	(0.745)	
PCB-96	(0.409)		PCB-117	(0.799)		PCB-152	(0.646)		PCB-146	(0.842)	
PCB-103	(0.966)		PCB-116/85	(0.957)	C	PCB-150	(0.651)		PCB-161	(0.665)	
PCB-94	(1.12)		PCB-110	[1.57]	J EMPC	PCB-136	(0.695)		PCB-153/168	[1.51]	J EMPC C
PCB-95	(1.05)		PCB-115	(0.78)		PCB-145	(0.684)		PCB-141	(0.892)	
PCB-100/93	(1.01)	C	PCB-82	(1.28)		PCB-148	(0.848)		PCB-130	(1.04)	
PCB-102	(0.966)		PCB-111	(0.759)		PCB-151/135	(0.881)	C	PCB-137	(0.902)	
PCB-98	(1.08)		PCB-120	(0.772)		PCB-154	(0.768)		PCB-164	(0.642)	
PCB-88	(1.23)		PCB-107/124	(0.839)	C	PCB-144	(0.852)		PCB-163/138/129	2.44	J C
PCB-91	(0.897)		PCB-109	(0.737)		PCB-147/149	(0.854)	C	PCB-160	(0.695)	
PCB-84	(1.22)		PCB-123	(0.785)		PCB-134	(1.02)		PCB-158	(0.63)	
PCB-89	(1.16)		PCB-106	(0.808)		PCB-143	(0.906)		PCB-128/166	(0.567)	C
PCB-121	(0.776)		PCB-118	0.99	J	PCB-139/140	(0.844)	C	PCB-159	(0.475)	
PCB-92	(1.12)		PCB-122	(0.919)		PCB-131	(0.977)		PCB-162	(0.462)	
PCB-113/90/101	(0.945)	C	PCB-114	(0.761)		PCB-142	(0.948)		PCB-167	(0.448)	
PCB-83	(1.4)		PCB-105	(0.768)		PCB-132	(0.935)		PCB-156/157	(0.67)	C
PCB-99	(0.926)		PCB-127	(0.829)		PCB-133	(0.923)		PCB-169	(0.479)	
PCB-112	(0.811)		PCB-126	(0.539)							
			Conc.	0.99					**Conc.**	2.44	
			EMPC	2.56					**EMPC**	3.96	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.231)		PCB-174	(0.606)		PCB-202	(0.332)		PCB-208	(3.28)	
PCB-179	(0.254)		PCB-177	(0.64)		PCB-201	(0.332)		PCB-207	(3.13)	
PCB-184	(0.265)		PCB-181	(0.554)		PCB-204	(0.352)		PCB-206	(4.42)	
PCB-176	(0.237)		PCB-171/173	(0.633)	C	PCB-197	(0.337)				
PCB-186	(0.248)		PCB-172	(0.629)		PCB-200	(0.335)		**Conc.**	0	
PCB-178	(0.348)		PCB-192	(0.477)		PCB-198/199	(0.476)	C	**EMPC**	0	
PCB-175	(0.582)		PCB-180/193	(0.508)	C	PCB-196	(0.452)				
PCB-187	(0.543)		PCB-191	(0.457)		PCB-203	(0.427)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.525)		PCB-170	(0.685)		PCB-195	(0.514)		PCB-209	(0.372)	
PCB-183	(0.519)		PCB-190	(0.481)		PCB-194	(0.458)				
PCB-185	(0.573)		PCB-189	(0.526)		PCB-205	(0.33)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM4_PCB_06072017_16MAR2018		
Instrument ID:	MM4	GC Column ID:	
VER Data Filename:	180716S07	Analysis Date:	16-JUL-2018 16:53:53
Lab ID:	OPR1_16007_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	115	50	-	150	Y
PCB-3 4-MoCB	50	106	50	-	150	Y
PCB-4 22'-DiCB	50	110	50	-	150	Y
PCB-15 44'-DiCB	50	107	50	-	150	Y
PCB-19 22'6-TrCB	50	112	50	-	150	Y
PCB-37 344'-TrCB	50	108	50	-	150	Y
PCB-54 22'66'-TeCB	50	110	50	-	150	Y
PCB-77 33'44'-TeCB	50	108	50	-	150	Y
PCB-81 344'5-TeCB	50	104	50	-	150	Y
PCB-104 22'466'-PeCB	50	123	50	-	150	Y
PCB-105 233'44'-PeCB	50	112	50	-	150	Y
PCB-114 2344'5-PeCB	50	121	50	-	150	Y
PCB-118 23'44'5-PeCB	50	115	50	-	150	Y
PCB-123 23'44'5'-PeCB	50	116	50	-	150	Y
PCB-126 33'44'5-PeCB	50	118	50	-	150	Y
PCB-155 22'44'66'-HxCB	50	119	50	-	150	Y
PCB-156/157 ...-HxCB	100	113	50	-	150	Y
PCB-167 23'44'55'-HxCB	50	122	50	-	150	Y
PCB-169 33'44'55'-HxCB	50	110	50	-	150	Y
PCB-188 22'34'566'-HpCB	50	121	50	-	150	Y
PCB-189 233'44'55'-HpCB	50	117	50	-	150	Y
PCB-202 22'33'55'66'-OcCB	50	107	50	-	150	Y
PCB-205 233'44'55'6-OcCB	50	111	50	-	150	Y
PCB-206 22'33'44'55'6-NoCB	50	111	50	-	150	Y
PCB-208 22'33'455'66'-NoCB	50	123	50	-	150	Y
PCB-209 DeCB	50	110	50	-	150	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668A.

Processed: 18 Jul 2018 14:35 Analyst: MC

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_06072017_16MAR2018
Instrument ID: MM4 GC Column ID:
VER Data Filename: 180716S07 Analysis Date: 16-JUL-2018 16:53:53
Lab ID: OPR1_16007_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	99.1	15	-	140	Y
ES PCB-3	100	98.3	15	-	140	Y
ES PCB-4	100	121	30	-	140	Y
ES PCB-15	100	101	30	-	140	Y
ES PCB-19	100	119	30	-	140	Y
ES PCB-37	100	83.9	30	-	140	Y
ES PCB-54	100	100	30	-	140	Y
ES PCB-77	100	94.3	30	-	140	Y
ES PCB-81	100	93.6	30	-	140	Y
ES PCB-104	100	107	30	-	140	Y
ES PCB-105	100	110	30	-	140	Y
ES PCB-114	100	110	30	-	140	Y
ES PCB-118	100	110	30	-	140	Y
ES PCB-123	100	111	30	-	140	Y
ES PCB-126	100	101	30	-	140	Y
ES PCB-153	100	95.6	30	-	140	Y
ES PCB-155	100	91.9	30	-	140	Y
ES PCB-156/157	200	90.9	30	-	140	Y
ES PCB-167	100	88.4	30	-	140	Y
ES PCB-169	100	94.2	30	-	140	Y
ES PCB-170	100	101	30	-	140	Y
ES PCB-180	100	102	30	-	140	Y
ES PCB-188	100	96	30	-	140	Y
ES PCB-189	100	90.5	30	-	140	Y
ES PCB-202	100	96.8	30	-	140	Y
ES PCB-205	100	96.5	30	-	140	Y
ES PCB-206	100	97.9	30	-	140	Y
ES PCB-208	100	102	30	-	140	Y
ES PCB-209	100	95.7	30	-	140	Y
CLEANUP STANDARDS						
CS PCB-28	100	77.9	40	-	125	Y
CS PCB-111	100	107	40	-	125	Y
CS PCB-178	100	98.8	40	-	125	Y

Processed: 18 Jul 2018 14:35 Analyst: MC

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*17-May-18 at 09:56*
AP Project name:	*B2413*
Requested TAT:	*22 days*
Projected due date:	*25-Jul-18*
Matrix:	*Aqueous*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Nord Door*
Project PO#:	*108.00228.00048*
QAAP/Contract #:	
Requested Analysis:	*Method 1668A*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
Duplicate-0518	B2413_001	Water	2	1-Liter Amber	14-May-18	14:12	0.4	1	7810 0249 2111

Preservation Type: **Sample Seals:** No

Notes/Comments:

Samples received intact.

Extract per client request: B2267-008. Filter w/ 0.45um filter before extraction.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens *Logged in by: Ashley Owens* *QC'ed by:* ____________

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

~~B2267~~
B2413

SGS CHAIN OF CUSTODY

PROJECT INFO
PROJECT: Nord Door
P.O. #: 108.00228.00048
QUOTE #:
SITE REF:
TURN AROUND TIME: standard
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS
> Hold Duplicate-0518 and Field-0518

SEND DOCUMENTATION / RESULTS TO
COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd, Ste 440
West Linn, OR 97068
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.co
smiller@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

PRESERVATIVE

ANALYSIS & METHOD

	SAMPLE ID / DESCRIPTION	DATE	TIME	QTY	MATRIX	Dioxins/Furans	PCB Congeners									MS MSD	MS/DUP	REMARKS
001	Seep-N-2	5/15/18	1408	2	water	X												
002	Seep-N-14	5/15/18	1321	↓	↓	X												
003	Seep-N-18	5/15/18	1255			X												
004	Seep-S-1	5/14/18	1455			X	X											
005	Seep-S-9	5/14/18	1248				X											
006	Seep-S-14	5/15/18	1214			X	X											
007	Seep-S-16	5/14/18	1342			X	X											
008	Duplicate-0518 *	5/14/18	1412			X	X											*=Samples in this project.
009	Field-0518	5/15/18	1435			X	X											

COLLECTED/RELINQUISHED BY (1): DATE: 5/16/18 TIME: 1300 RECEIVED BY:
RELINQUISHED BY (2): DATE: TIME: RECEIVED BY:
RELINQUISHED BY (3): DATE: TIME: RECEIVED BY:

RECEIVED BY LABORATORY: Ashley Owens DATE: 5/17/18 TIME: 9:56
COOLER SEAL: ☒ INTACT ☐ BROKEN ☐ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: FedEx TEMP: °C 1.1°/0.4°
TRACKING #: 7810 0249 2100
7810 0249 2111

ANALYTICAL REPORT

May 24, 2018

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L994838
Samples Received:	05/17/2018
Project Number:	108.00228.00048
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Technical Service Representative

TABLE OF CONTENTS

SEEP-N-2 L994838-01 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/15/18 14:08	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 13:05	05/19/18 13:05	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 04:40	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 17:50	KM

SEEP-N-14 L994838-02 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/15/18 13:21	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 13:25	05/19/18 13:25	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 04:57	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 18:12	KM

SEEP-N-18 L994838-03 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/15/18 12:55	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 13:45	05/19/18 13:45	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 05:13	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 18:34	KM

SEEP-S-1 L994838-04 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/14/18 14:55	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 14:04	05/19/18 14:04	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 05:29	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 18:56	KM

SEEP-S-9 L994838-05 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/14/18 12:48	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 14:24	05/19/18 14:24	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 05:45	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 19:18	KM

SEEP-S-14 L994838-06 GW

Collected by	Collected date/time	Received date/time
Steven L.	05/15/18 12:14	05/17/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 15:42	05/19/18 15:42	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 06:01	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 19:40	KM

Collected by Steven L. | Collected date/time 05/14/18 13:42 | Received date/time 05/17/18 08:45

SEEP-S-16 L994838-07 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 16:02	05/19/18 16:02	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 06:17	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1112962	1	05/20/18 07:09	05/20/18 20:02	KM

Collected by Steven L. | Collected date/time 05/14/18 14:12 | Received date/time 05/17/18 08:45

DUPLICATE-0518 L994838-08 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1113612	1	05/19/18 16:22	05/19/18 16:22	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1113743	1	05/20/18 20:57	05/23/18 06:34	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1113903	1	05/20/18 20:55	05/21/18 09:07	KM

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Technical Service Representative

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 13:05	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 13:05	WG1113612
(S) Toluene-d8	*109*			*80.0-120*		*05/19/2018 13:05*	WG1113612
(S) Dibromofluoromethane	*96.5*			*76.0-123*		*05/19/2018 13:05*	WG1113612
(S) 4-Bromofluorobenzene	*94.1*			*80.0-120*		*05/19/2018 13:05*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 04:40	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 04:40	WG1113743
(S) o-Terphenyl	*99.8*			*52.0-156*		*05/23/2018 04:40*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 17:50	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 17:50	WG1112962
Benzo(b)fluoranthene	U		0.00212	0.0500	1	05/20/2018 17:50	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 17:50	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 17:50	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 17:50	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 17:50	WG1112962
(S) Nitrobenzene-d5	*115*			*31.0-160*		*05/20/2018 17:50*	WG1112962
(S) 2-Fluorobiphenyl	*108*			*48.0-148*		*05/20/2018 17:50*	WG1112962
(S) p-Terphenyl-d14	*129*			*37.0-146*		*05/20/2018 17:50*	WG1112962

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 13:25	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 13:25	WG1113612
(S) Toluene-d8	*108*			*80.0-120*		*05/19/2018 13:25*	WG1113612
(S) Dibromofluoromethane	*96.4*			*76.0-123*		*05/19/2018 13:25*	WG1113612
(S) 4-Bromofluorobenzene	*98.9*			*80.0-120*		*05/19/2018 13:25*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 04:57	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 04:57	WG1113743
(S) o-Terphenyl	*103*			*52.0-156*		*05/23/2018 04:57*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 18:12	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 18:12	WG1112962
Benzo(b)fluoranthene	U		0.00212	0.0500	1	05/20/2018 18:12	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 18:12	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 18:12	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 18:12	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 18:12	WG1112962
(S) Nitrobenzene-d5	*111*			*31.0-160*		*05/20/2018 18:12*	WG1112962
(S) 2-Fluorobiphenyl	*100*			*48.0-148*		*05/20/2018 18:12*	WG1112962
(S) p-Terphenyl-d14	*126*			*37.0-146*		*05/20/2018 18:12*	WG1112962

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SEEP-N-18
Collected date/time: 05/15/18 12:55

SAMPLE RESULTS - 03

L994838

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 13:45	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 13:45	WG1113612
(S) Toluene-d8	*107*			*80.0-120*		*05/19/2018 13:45*	WG1113612
(S) Dibromofluoromethane	*95.5*			*76.0-123*		*05/19/2018 13:45*	WG1113612
(S) 4-Bromofluorobenzene	*96.5*			*80.0-120*		*05/19/2018 13:45*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 05:13	WG1113743
Residual Range Organics (RRO)	470		82.5	250	1	05/23/2018 05:13	WG1113743
(S) o-Terphenyl	*97.4*			*52.0-156*		*05/23/2018 05:13*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 18:34	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 18:34	WG1112962
Benzo(b)fluoranthene	0.00250	B J	0.00212	0.0500	1	05/20/2018 18:34	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 18:34	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 18:34	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 18:34	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 18:34	WG1112962
(S) Nitrobenzene-d5	*112*			*31.0-160*		*05/20/2018 18:34*	WG1112962
(S) 2-Fluorobiphenyl	*109*			*48.0-148*		*05/20/2018 18:34*	WG1112962
(S) p-Terphenyl-d14	*129*			*37.0-146*		*05/20/2018 18:34*	WG1112962

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 14:04	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 14:04	WG1113612
(S) Toluene-d8	*105*			*80.0-120*		*05/19/2018 14:04*	WG1113612
(S) Dibromofluoromethane	*97.1*			*76.0-123*		*05/19/2018 14:04*	WG1113612
(S) 4-Bromofluorobenzene	*94.4*			*80.0-120*		*05/19/2018 14:04*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 05:29	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 05:29	WG1113743
(S) o-Terphenyl	*99.5*			*52.0-156*		*05/23/2018 05:29*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 18:56	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 18:56	WG1112962
Benzo(b)fluoranthene	U		0.00212	0.0500	1	05/20/2018 18:56	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 18:56	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 18:56	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 18:56	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 18:56	WG1112962
(S) Nitrobenzene-d5	*117*			*31.0-160*		*05/20/2018 18:56*	WG1112962
(S) 2-Fluorobiphenyl	*115*			*48.0-148*		*05/20/2018 18:56*	WG1112962
(S) p-Terphenyl-d14	*133*			*37.0-146*		*05/20/2018 18:56*	WG1112962

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 14:24	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 14:24	WG1113612
(S) Toluene-d8	*109*			*80.0-120*		*05/19/2018 14:24*	WG1113612
(S) Dibromofluoromethane	*94.9*			*76.0-123*		*05/19/2018 14:24*	WG1113612
(S) 4-Bromofluorobenzene	*95.6*			*80.0-120*		*05/19/2018 14:24*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	115	J	66.0	200	1	05/23/2018 05:45	WG1113743
Residual Range Organics (RRO)	239	J	82.5	250	1	05/23/2018 05:45	WG1113743
(S) o-Terphenyl	*99.8*			*52.0-156*		*05/23/2018 05:45*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 19:18	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 19:18	WG1112962
Benzo(b)fluoranthene	0.00429	B J	0.00212	0.0500	1	05/20/2018 19:18	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 19:18	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 19:18	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 19:18	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 19:18	WG1112962
(S) Nitrobenzene-d5	*109*			*31.0-160*		*05/20/2018 19:18*	WG1112962
(S) 2-Fluorobiphenyl	*104*			*48.0-148*		*05/20/2018 19:18*	WG1112962
(S) p-Terphenyl-d14	*126*			*37.0-146*		*05/20/2018 19:18*	WG1112962

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 15:42	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 15:42	WG1113612
(S) Toluene-d8	*109*			*80.0-120*		*05/19/2018 15:42*	WG1113612
(S) Dibromofluoromethane	*97.6*			*76.0-123*		*05/19/2018 15:42*	WG1113612
(S) 4-Bromofluorobenzene	*91.9*			*80.0-120*		*05/19/2018 15:42*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 06:01	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 06:01	WG1113743
(S) o-Terphenyl	*105*			*52.0-156*		*05/23/2018 06:01*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 19:40	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 19:40	WG1112962
Benzo(b)fluoranthene	U		0.00212	0.0500	1	05/20/2018 19:40	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 19:40	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 19:40	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 19:40	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 19:40	WG1112962
(S) Nitrobenzene-d5	*116*			*31.0-160*		*05/20/2018 19:40*	WG1112962
(S) 2-Fluorobiphenyl	*113*			*48.0-148*		*05/20/2018 19:40*	WG1112962
(S) p-Terphenyl-d14	*132*			*37.0-146*		*05/20/2018 19:40*	WG1112962

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	05/19/2018 16:02	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 16:02	WG1113612
(S) Toluene-d8	*107*			*80.0-120*		*05/19/2018 16:02*	WG1113612
(S) Dibromofluoromethane	*99.6*			*76.0-123*		*05/19/2018 16:02*	WG1113612
(S) 4-Bromofluorobenzene	*93.2*			*80.0-120*		*05/19/2018 16:02*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 06:17	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 06:17	WG1113743
(S) o-Terphenyl	*96.6*			*52.0-156*		*05/23/2018 06:17*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	05/20/2018 20:02	WG1112962
Benzo(a)pyrene	U		0.0116	0.0500	1	05/20/2018 20:02	WG1112962
Benzo(b)fluoranthene	0.00415	B J	0.00212	0.0500	1	05/20/2018 20:02	WG1112962
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/20/2018 20:02	WG1112962
Chrysene	U		0.0108	0.0500	1	05/20/2018 20:02	WG1112962
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/20/2018 20:02	WG1112962
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/20/2018 20:02	WG1112962
(S) Nitrobenzene-d5	*119*			*31.0-160*		*05/20/2018 20:02*	WG1112962
(S) 2-Fluorobiphenyl	*106*			*48.0-148*		*05/20/2018 20:02*	WG1112962
(S) p-Terphenyl-d14	*136*			*37.0-146*		*05/20/2018 20:02*	WG1112962

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Benzene	U		0.0896	0.500	1	05/19/2018 16:22	WG1113612
Naphthalene	U	J0	0.174	2.50	1	05/19/2018 16:22	WG1113612
(S) Toluene-d8	*108*			*80.0-120*		*05/19/2018 16:22*	WG1113612
(S) Dibromofluoromethane	*97.2*			*76.0-123*		*05/19/2018 16:22*	WG1113612
(S) 4-Bromofluorobenzene	*89.7*			*80.0-120*		*05/19/2018 16:22*	WG1113612

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Diesel Range Organics (DRO)	U		66.0	200	1	05/23/2018 06:34	WG1113743
Residual Range Organics (RRO)	U		82.5	250	1	05/23/2018 06:34	WG1113743
(S) o-Terphenyl	*94.0*			*52.0-156*		*05/23/2018 06:34*	WG1113743

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Benzo(a)anthracene	U		0.00410	0.0500	1	05/21/2018 09:07	WG1113903
Benzo(a)pyrene	U		0.0116	0.0500	1	05/21/2018 09:07	WG1113903
Benzo(b)fluoranthene	U		0.00212	0.0500	1	05/21/2018 09:07	WG1113903
Benzo(k)fluoranthene	U		0.0136	0.0500	1	05/21/2018 09:07	WG1113903
Chrysene	U		0.0108	0.0500	1	05/21/2018 09:07	WG1113903
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	05/21/2018 09:07	WG1113903
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	05/21/2018 09:07	WG1113903
(S) Nitrobenzene-d5	*101*			*31.0-160*		*05/21/2018 09:07*	WG1113903
(S) 2-Fluorobiphenyl	*98.7*			*48.0-148*		*05/21/2018 09:07*	WG1113903
(S) p-Terphenyl-d14	*114*			*37.0-146*		*05/21/2018 09:07*	WG1113903

Method Blank (MB)

(MB) R3311358-2 05/19/18 11:39

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzene	U		0.0896	0.500
Naphthalene	0.179	J	0.174	2.50
(S) Toluene-d8	*108*			*80.0-120*
(S) Dibromofluoromethane	*96.2*			*76.0-123*
(S) 4-Bromofluorobenzene	*94.7*			*80.0-120*

Laboratory Control Sample (LCS)

(LCS) R3311358-1 05/19/18 11:00

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	25.0	22.8	91.1	69.0-123	
Naphthalene	25.0	16.6	66.3	62.0-128	
(S) Toluene-d8			*104*	*80.0-120*	
(S) Dibromofluoromethane			*95.3*	*76.0-123*	
(S) 4-Bromofluorobenzene			*103*	*80.0-120*	

L995065-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L995065-02 05/19/18 19:38 • (MS) R3311358-3 05/19/18 19:57 • (MSD) R3311358-4 05/19/18 20:17

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	25.0	ND	25.5	25.5	102	102	1	34.0-147			0.158	20
Naphthalene	25.0	ND	16.3	15.8	65.0	63.3	1	42.0-146			2.68	24
(S) Toluene-d8					*104*	*107*		*80.0-120*				
(S) Dibromofluoromethane					*96.8*	*97.8*		*76.0-123*				
(S) 4-Bromofluorobenzene					*101*	*102*		*80.0-120*				

Method Blank (MB)

(MB) R3312314-1 05/22/18 17:34

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*99.5*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3312314-2 05/22/18 17:51 • (LCSD) R3312314-3 05/22/18 18:07

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	750	739	777	98.5	104	50.0-150			4.99	20
Residual Range Organics (RRO)	750	703	728	93.7	97.1	50.0-150			3.50	20
(S) o-Terphenyl				*105*	*107*	*52.0-156*				

Method Blank (MB)

(MB) R3311677-3 05/20/18 12:21

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzo(a)anthracene	U		0.00410	0.0500
Benzo(a)pyrene	U		0.0116	0.0500
Benzo(b)fluoranthene	0.00302	J	0.00212	0.0500
Benzo(k)fluoranthene	U		0.0136	0.0500
Chrysene	U		0.0108	0.0500
Dibenz(a,h)anthracene	U		0.00396	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500
(S) Nitrobenzene-d5	*114*			*31.0-160*
(S) 2-Fluorobiphenyl	*95.7*			*48.0-148*
(S) p-Terphenyl-d14	*126*			*37.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3311677-1 05/20/18 11:36 • (LCSD) R3311677-2 05/20/18 11:59

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	2.00	2.03	2.07	102	103	59.0-134			1.56	20
Benzo(a)pyrene	2.00	2.13	2.16	107	108	61.0-145			1.20	20
Benzo(b)fluoranthene	2.00	2.12	2.10	106	105	57.0-136			1.14	20
Benzo(k)fluoranthene	2.00	2.11	2.23	106	111	57.0-141			5.36	20
Chrysene	2.00	2.03	2.07	101	103	63.0-140			1.99	20
Dibenz(a,h)anthracene	2.00	2.23	2.25	112	112	49.0-141			0.794	20
Indeno(1,2,3-cd)pyrene	2.00	2.23	2.25	111	113	53.0-141			1.23	20
(S) Nitrobenzene-d5				*118*	*114*	*31.0-160*				
(S) 2-Fluorobiphenyl				*97.4*	*94.9*	*48.0-148*				
(S) p-Terphenyl-d14				*123*	*122*	*37.0-146*				

Method Blank (MB)

(MB) R3311907-3 05/21/18 02:31

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzo(a)anthracene	U		0.00410	0.0500
Benzo(a)pyrene	U		0.0116	0.0500
Benzo(b)fluoranthene	U		0.00212	0.0500
Benzo(k)fluoranthene	U		0.0136	0.0500
Chrysene	U		0.0108	0.0500
Dibenz(a,h)anthracene	U		0.00396	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500
(S) Nitrobenzene-d5	*102*			*31.0-160*
(S) 2-Fluorobiphenyl	*110*			*48.0-148*
(S) p-Terphenyl-d14	*118*			*37.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3311907-1 05/21/18 01:44 • (LCSD) R3311907-2 05/21/18 02:07

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	2.00	2.18	2.18	109	109	59.0-134			0.298	20
Benzo(a)pyrene	2.00	2.03	2.12	101	106	61.0-145			4.55	20
Benzo(b)fluoranthene	2.00	1.98	2.04	98.9	102	57.0-136			3.21	20
Benzo(k)fluoranthene	2.00	2.11	2.16	106	108	57.0-141			2.35	20
Chrysene	2.00	2.04	2.11	102	106	63.0-140			3.32	20
Dibenz(a,h)anthracene	2.00	2.04	2.08	102	104	49.0-141			1.77	20
Indeno(1,2,3-cd)pyrene	2.00	2.05	2.10	102	105	53.0-141			2.35	20
(S) Nitrobenzene-d5				*100*	*106*	*31.0-160*				
(S) 2-Fluorobiphenyl				*101*	*107*	*48.0-148*				
(S) p-Terphenyl-d14				*110*	*116*	*37.0-146*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J0	J0: Calibration verification outside of acceptance limits. Result is estimated.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

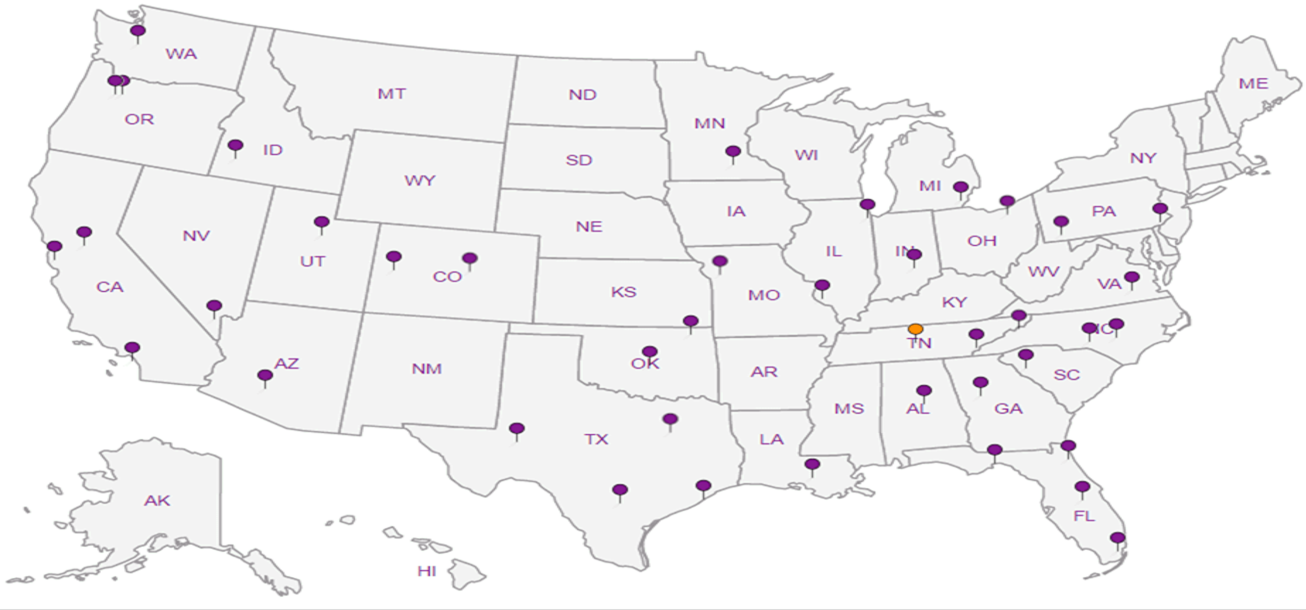
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:

Accounts Payable
1800 Blankenship Rd, Ste 440
West Linn, OR 97068

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Chris Kramer**

Email To: ckramer@slrconsulting.com; smiller@slrconsulting.com;

Project Description: **Nord Door Project - Everett, WA**

City/State Collected:

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.00048**

Lab Project # **SLRWLOR-NORDDOOR**

L# 994838

B149

Acctnum: **SLRWLOR**
Template: **T135873**
Prelogin: **P652609**
TSR: **110 - Brian Ford**
PB:
Shipped Via:

Collected by (print): Steven Loskeben

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y [✓ X]

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Standart TAT

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	NWTPHDX LVINOSGT 40mlAmb-HCl-BT	PAHSIMLVID cPAHs 40mlAmb-NoPres-WT	V8260LLC benz/naph 40mlAmb-HCl	Remarks	Sample # (lab only)
Seep-N-2	Grab	GW	surface	5/15/18	1408	7	X	X	X		-01
Seep-N-14	↓	GW	↓	5/15/18	1321	7	X	X	X		-02
Seep-N-18		GW		5/15/18	1255	7	X	X	X		-03
Seep-S-1		GW		5/14/18	1455	7	X	X	X		-04
Seep-S-9		GW		5/14/18	1248	7	X	X	X		-05
Seep-S-14		GW		5/15/18	1214	7	X	X	X		-06
Seep-S-16		GW		5/14/18	1342	7	X	X	X		-07
Duplicate-0518		GW		5/14/18	1412	7	X	X	X		
Field-0518		GW		5/15/18	1435	7	X	X	X		
		GW									

* Matrix:
SS - Soil AIR - Air F - Filter
[✓ GW] - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_______

Remarks: Hold Duplicate-0518 and Field-0518 pending results.

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking # 4361 6932 0946

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓ Y __N
COC Signed/Accurate: ✓ Y __N
Bottles arrive intact: ✓ Y __N
Correct bottles used: ✓ Y __N
Sufficient volume sent: ✓ Y __N
If Applicable
VOA Zero Headspace: ✓ Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date: 5/16/18	Time: 1500	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: [✓ Yes] / No
1 [✓ HCl] / MeoH
TBR

Temp: 5.5 °C
Bottles Received: 63

Date: 5-17-18
Time: 0845

If preservation required by Login: Date/Time

5-111

Condition: NCF / [✓ OK]

Andy Vann

From: Brian Ford
Sent: Friday, May 18, 2018 11:11 AM
To: Login; Brian Ford
Subject: L994838 *SLRWLOR* log off hold

Please log Duplicate-0518 off hold label 05-111 for NWTPHDXLVINOSGT, PAHSIMLVID, and V8260LLC. Can be added to L994838.

Thanks,

Brian Ford
Technical Service Representative
ESC Lab Sciences-a subsidiary of Pace Analytical
12065 Lebanon Road | Mt. Juliet, TN 37122
615.773.9772
bford@esclabsciences.com | www.esclabsciences.com

NTD Inlet Water Sampling

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value “H” is assigned. If the obtained value is less than half the specified value “h” is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. ‘Xx’ denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the “D” indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the “S” indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

Sample ID: NTD-SW-East-0418 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Lab Sample ID	B2138_15770_DF_001	Date Extracted:	20-Apr-2018
Date Collected:	05-Apr-2018	pH:	6	QC Batch No:	15770	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	7:15:15

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.2			ES 2378-TCDD	94.1	
12378-PeCDD	ND	1.35			ES 12378-PeCDD	90.3	
123478-HxCDD	ND	2.49			ES 123478-HxCDD	89.8	
123678-HxCDD	ND	2.59			ES 123678-HxCDD	89.3	
123789-HxCDD	ND	2.51			ES 123789-HxCDD	92.4	
1234678-HpCDD	EMPC		6.95	J	ES 1234678-HpCDD	86.3	
OCDD	81.4			B	ES OCDD	60	
2378-TCDF	ND	1.35			ES 2378-TCDF	93.3	
12378-PeCDF	ND	0.959			ES 12378-PeCDF	90	
23478-PeCDF	ND	0.953			ES 23478-PeCDF	90.4	
123478-HxCDF	ND	1.48			ES 123478-HxCDF	84.7	
123678-HxCDF	ND	1.44			ES 123678-HxCDF	83	
234678-HxCDF	ND	1.49			ES 234678-HxCDF	82.6	
123789-HxCDF	ND	1.71			ES 123789-HxCDF	88.8	
1234678-HpCDF	EMPC		2.36	J	ES 1234678-HpCDF	79.4	
1234789-HpCDF	ND	1.11			ES 1234789-HpCDF	82	
OCDF	ND	1.96			ES OCDF	67.2	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	101	
Total TCDD	ND	2.2	ND		CS 12347-PeCDD	98.1	
Total PeCDD	ND	1.35	ND		CS 12346-PeCDF	101	
Total HxCDD	ND	2.52	ND		CS 123469-HxCDF	96.6	
Total HpCDD	6.34		13.3		CS 1234689-HpCDF	94.9	
Total TCDF	ND	1.35	ND				
Total PeCDF	ND	0.956	ND				
Total HxCDF	ND	1.52	ND				
Total HpCDF	ND		5.21				
Total PCDD/Fs	**87.7**		**99.9**				
ITEF TEQs							
TEQ: ND=0	0.0814		0.174				
TEQ: ND=DL/2	2.54	2.48	2.63				
TEQ: ND=DL	5	4.96	5.1				

SGS

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

Checkcode: 088-540-XHL SGS North America - DF v0.50 Report Created: 04-May-2018 13:16 Analyst: pw

Sample ID: NTD-SW-West-0418 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Lab Sample ID	B2138_15770_DF_002	Date Extracted:	20-Apr-2018
Date Collected:	05-Apr-2018	pH:	6	QC Batch No:	15770	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	8:03:01

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	1.8			ES 2378-TCDD	91.2	
12378-PeCDD	ND	0.96			ES 12378-PeCDD	89.7	
123478-HxCDD	ND	1.66			ES 123478-HxCDD	81.5	
123678-HxCDD	ND	1.68			ES 123678-HxCDD	83.8	
123789-HxCDD	ND	1.72			ES 123789-HxCDD	84.5	
1234678-HpCDD	13.6			J	ES 1234678-HpCDD	78.7	
OCDD	142				ES OCDD	65.1	
2378-TCDF	ND	1.36			ES 2378-TCDF	90.7	
12378-PeCDF	ND	0.904			ES 12378-PeCDF	87.3	
23478-PeCDF	ND	0.867			ES 23478-PeCDF	85.8	
123478-HxCDF	ND	1.26			ES 123478-HxCDF	78.6	
123678-HxCDF	ND	1.31			ES 123678-HxCDF	77.7	
234678-HxCDF	ND	1.35			ES 234678-HxCDF	74.5	
123789-HxCDF	ND	1.42			ES 123789-HxCDF	80.8	
1234678-HpCDF	2.38			J	ES 1234678-HpCDF	76.1	
1234789-HpCDF	ND	1.27			ES 1234789-HpCDF	76.7	
OCDF	5.12			J	ES OCDF	65.8	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	100	
Total TCDD	ND	1.8	ND		CS 12347-PeCDD	100	
Total PeCDD	ND	0.96	ND		CS 12346-PeCDF	99.4	
Total HxCDD	ND	1.68	ND		CS 123469-HxCDF	91.9	
Total HpCDD	13.6		22.2		CS 1234689-HpCDF	91.2	
Total TCDF	ND	1.36	ND				
Total PeCDF	ND	0.886	ND				
Total HxCDF	1.46		1.46				
Total HpCDF	2.38		5.77				
Total PCDD/Fs	**165**		**177**				
ITEF TEQs							
TEQ: ND=0	0.307		0.307				
TEQ: ND=DL/2	2.28	1.99	2.28				
TEQ: ND=DL	4.25	3.98	4.25				

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Sample ID: NTD-SW-3"-0418 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.05 L	Lab Sample ID	B2138_15770_DF_003	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH:	6	QC Batch No:	15770	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	8:50:49

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.17			ES 2378-TCDD	93.9	
12378-PeCDD	ND	1.27			ES 12378-PeCDD	92.8	
123478-HxCDD	ND	1.6			ES 123478-HxCDD	90.3	
123678-HxCDD	ND	1.81			ES 123678-HxCDD	90.6	
123789-HxCDD	ND	1.69			ES 123789-HxCDD	89.3	
1234678-HpCDD	3.1			J	ES 1234678-HpCDD	85.6	
OCDD	EMPC		19.9	J B	ES OCDD	65.9	
2378-TCDF	ND	1.54			ES 2378-TCDF	95.4	
12378-PeCDF	ND	1.02			ES 12378-PeCDF	91.2	
23478-PeCDF	ND	0.914			ES 23478-PeCDF	91.5	
123478-HxCDF	ND	1.29			ES 123478-HxCDF	83.2	
123678-HxCDF	ND	1.26			ES 123678-HxCDF	83.1	
234678-HxCDF	ND	1.36			ES 234678-HxCDF	79.7	
123789-HxCDF	ND	1.5			ES 123789-HxCDF	83.3	
1234678-HpCDF	ND	0.686			ES 1234678-HpCDF	82.2	
1234789-HpCDF	ND	0.765			ES 1234789-HpCDF	79.9	
OCDF	ND	1.89			ES OCDF	68.4	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	102	
Total TCDD	ND	2.17	ND		CS 12347-PeCDD	100	
Total PeCDD	ND	1.27	ND		CS 12346-PeCDF	96.5	
Total HxCDD	ND	1.7	ND		CS 123469-HxCDF	93.8	
Total HpCDD	3.1		7.26		CS 1234689-HpCDF	91	
Total TCDF	ND	1.54	ND				
Total PeCDF	ND	0.97	ND				
Total HxCDF	ND	1.34	ND				
Total HpCDF	ND	0.723	ND				
Total PCDD/Fs	**3.1**		**27.1**				
ITEF TEQs							
TEQ: ND=0	0.031		0.0509				
TEQ: ND=DL/2	2.3	2.28	2.32				
TEQ: ND=DL	4.57	4.56	4.59				

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Sample ID: NTD-SW-8"-0418 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.02 L	Lab Sample ID	B2138_15770_DF_004	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH:	4	QC Batch No:	15770	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	9:38:36

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	1.6			ES 2378-TCDD	97.2	
12378-PeCDD	ND	0.936			ES 12378-PeCDD	95.4	
123478-HxCDD	ND	1.85			ES 123478-HxCDD	87	
123678-HxCDD	ND	1.74			ES 123678-HxCDD	92.7	
123789-HxCDD	ND	1.76			ES 123789-HxCDD	91.3	
1234678-HpCDD	7.74			J	ES 1234678-HpCDD	88.4	
OCDD	29.8			J B	ES OCDD	67.8	
2378-TCDF	ND	1.17			ES 2378-TCDF	94.4	
12378-PeCDF	ND	0.936			ES 12378-PeCDF	93.3	
23478-PeCDF	ND	0.904			ES 23478-PeCDF	92	
123478-HxCDF	ND	1.35			ES 123478-HxCDF	82.2	
123678-HxCDF	ND	1.31			ES 123678-HxCDF	82.6	
234678-HxCDF	ND	1.23			ES 234678-HxCDF	83.1	
123789-HxCDF	ND	1.48			ES 123789-HxCDF	85.2	
1234678-HpCDF	EMPC		1.61	J	ES 1234678-HpCDF	82.4	
1234789-HpCDF	ND	1			ES 1234789-HpCDF	84.9	
OCDF	4.34			J	ES OCDF	72.5	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	104	
Total TCDD	ND	1.6	ND		CS 12347-PeCDD	103	
Total PeCDD	ND	0.936	ND		CS 12346-PeCDF	100	
Total HxCDD	ND	1.78	ND		CS 123469-HxCDF	95.7	
Total HpCDD	7.74		17		CS 1234689-HpCDF	92.1	
Total TCDF	ND	1.17	ND				
Total PeCDF	ND	0.92	ND				
Total HxCDF	ND	1.33	ND				
Total HpCDF	2.67		4.28				
Total PCDD/Fs	**44.5**		**55.4**				
ITEF TEQs							
TEQ: ND=0	0.112		0.128				
TEQ: ND=DL/2	2	1.9	2.01				
TEQ: ND=DL	3.88	3.8	3.9				

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Sample ID: Method Blank B2138_15770 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Lab Project ID:	B2138	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.00 L	Lab Sample ID	MB1_15770_DF_TLX	Date Extracted:	20-Apr-2018
Date Collected:	n/a	pH:	n/a	QC Batch No:	15770	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	5:39:40

Analyte	Conc. (pg/L)	DL (pg/L)	EMPC (pg/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.09			ES 2378-TCDD	90.6	
12378-PeCDD	ND	0.918			ES 12378-PeCDD	90.9	
123478-HxCDD	ND	1.7			ES 123478-HxCDD	88.6	
123678-HxCDD	ND	1.58			ES 123678-HxCDD	90.3	
123789-HxCDD	ND	1.58			ES 123789-HxCDD	91.4	
1234678-HpCDD	ND	0.914			ES 1234678-HpCDD	86.8	
OCDD	10.9			J	ES OCDD	70.4	
2378-TCDF	ND	1.25			ES 2378-TCDF	91.1	
12378-PeCDF	ND	0.875			ES 12378-PeCDF	87.1	
23478-PeCDF	ND	0.876			ES 23478-PeCDF	87.6	
123478-HxCDF	ND	0.789			ES 123478-HxCDF	82.8	
123678-HxCDF	ND	0.801			ES 123678-HxCDF	81.8	
234678-HxCDF	ND	0.759			ES 234678-HxCDF	84.3	
123789-HxCDF	ND	0.968			ES 123789-HxCDF	86.2	
1234678-HpCDF	ND	0.64			ES 1234678-HpCDF	79.7	
1234789-HpCDF	ND	0.609			ES 1234789-HpCDF	79.9	
OCDF	ND	1.16			ES OCDF	72.8	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	94.9	
Total TCDD	ND	2.09	ND		CS 12347-PeCDD	93.7	
Total PeCDD	ND	0.918	ND		CS 12346-PeCDF	92.8	
Total HxCDD	ND	1.61	ND		CS 123469-HxCDF	90.2	
Total HpCDD	ND	0.914	ND		CS 1234689-HpCDF	89.2	
Total TCDF	ND	1.25	ND				
Total PeCDF	ND	0.876	ND				
Total HxCDF	ND	0.824	ND				
Total HpCDF	ND	0.627	ND				
Total PCDD/Fs	**10.9**		**10.9**				
ITEF TEQs							
TEQ: ND=0	0.0109		0.0109				
TEQ: ND=DL/2	2.01	2	2.01				
TEQ: ND=DL	4.01	4	4.01				

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METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_09062018_09OCT2017		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	180504R03	Analysis Date:	04-MAY-2018 03:16:19
Lab ID:	OPR1_15770_DF		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	9.47	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	47.4	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	51.3	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	50.9	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	48.3	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	51.9	35	-	70	Y
OCDD	100	106	78	-	144	Y
2,3,7,8-TCDF	10	10	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	51.4	40	-	67	Y
2,3,4,7,8-PeCDF	50	52.8	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	53	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	51.6	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	53.3	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	52.5	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	57.8	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	56.8	39	-	69	Y
OCDF	100	104	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 04 May 2018 13:16 Analyst: pw

METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_09062018_09OCT2017		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	180504R03	Analysis Date:	04-MAY-2018 03:16:19
Lab ID:	OPR1_15770_DF		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	95.4	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	94.3	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	91.1	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	91.9	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	94.4	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	90.4	26	-	166	Y
13C-OCDD	200	149	26	-	397	Y
13C-2,3,7,8-TCDF	100	98.3	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	92.9	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	92.3	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	82.3	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	84.7	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	84.3	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	85.2	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	82.8	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	81.6	20	-	186	Y
13C-OCDF	200	148	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	41	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 04 May 2018 13:16 Analyst: pw

Sample ID: NTD-SW-East-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Sample ID:	B2138_15770_PCB_001-RJ	Date Extracted:	20-Apr-2018
Date Collected:	05-Apr-2018	pH	6	QC Batch No.:	15770	Date Analyzed:	05-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	1.79			ES PCB-1	11.3 V
PCB-81 344'5-TeCB	ND	1.69			ES PCB-3	40.4
PCB-105 233'44'-PeCB	EMPC		3.66	J	ES PCB-4	49.3
PCB-114 2344'5-PeCB	ND	1.59			ES PCB-15	168 V
PCB-118 23'44'5-PeCB	9.27			J	ES PCB-19	118
PCB-123 23'44'5'-PeCB	ND	1.51			ES PCB-37	91.4
PCB-126 33'44'5-PeCB	ND	1.51			ES PCB-54	88
PCB-156/157 233'44'5/233'44'5'-HxCB	4.52			J C	ES PCB-77	90.7
PCB-167 23'44'55'-HxCB	2.13			J	ES PCB-81	89.6
PCB-169 33'44'55'-HxCB	ND	1.69			ES PCB-104	128
PCB-189 233'44'55'-HpCB	ND	0.969			ES PCB-105	116
					ES PCB-114	104
TEQs (WHO 2005 M/H)					ES PCB-118	108
					ES PCB-123	117
ND = 0	0.000478		0.000588		ES PCB-126	101
ND = 0.5 x DL	0.102		0.102		ES PCB-153	108
ND = DL	0.203		0.203		ES PCB-155	94
					ES PCB-156/157	84.9
Totals					ES PCB-167	86.8
Mono-CB	ND	10.9			ES PCB-169	76.8
Di-CB	3.41		26.7		ES PCB-170	106
Tri-CB			10.9		ES PCB-180	109
Tetra-CB	41.7		45.9		ES PCB-188	127
Penta-CB	53.5		61.3		ES PCB-189	95.6
Hexa-CB	145		163		ES PCB-202	118
Hepta-CB	277		283		ES PCB-205	107
Octa-CB	55.2		62		ES PCB-206	108
Nona-CB	ND	2.22			ES PCB-208	110
Deca-CB	ND	2.06			ES PCB-209	130
					CS PCB-28	82.1
Total PCB (Mono-Deca)	576		653		CS PCB-111	95.9
					CS PCB-178	112

Checkcode: 930-105-JZJ/A SGS North America - PCB v0.82 Report Created: 07-May-2018 07:04 Analyst: MS

Sample ID: NTD-SW-East-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Sample ID:	B2138_15770_PCB_001-RJ
Date Collected:	05-Apr-2018	pH	6	QC Batch No.:	15770
		Units	pg/L	Checkcode:	930-105-JZJ/A

Date Received:	06-Apr-2018
Date Extracted:	20-Apr-2018
Date Analyzed:	05-May-2018
Time Analyzed:	21:03:19

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(16.8)		PCB-19	(7.35)		PCB-54	(1.48)		PCB-72	(1.66)	
PCB-2	(5.45)		PCB-30/18	(5.92)	C	PCB-50/53	3.77	J C	PCB-68	(1.51)	
PCB-3	(5.09)		PCB-17	(6.79)		PCB-45	(2.37)		PCB-57	(1.71)	
			PCB-27	(4.97)		PCB-51	(1.84)		PCB-58	(1.68)	
Conc.	0		PCB-24	(5.2)		PCB-46	(2.34)		PCB-67	(1.6)	
EMPC	0		PCB-16	(9.02)		PCB-52	10.1		PCB-63	(1.52)	
			PCB-32	(4.66)		PCB-73	(1.59)		PCB-61/70/74/76	10	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(2.94)		PCB-43	(2.23)		PCB-66	3.75	J
PCB-4	(12.3)		PCB-23	(2.9)		PCB-69/49	4.79	J C	PCB-55	(1.74)	
PCB-10	(8.7)		PCB-26/29	(2.83)	C	PCB-48	(1.97)		PCB-56	(1.72)	
PCB-9	(3.51)		PCB-25	(2.81)		PCB-44/47/65	9.28	J C	PCB-60	(1.7)	
PCB-7	(3)		PCB-31	[3.2]	J EMPC	PCB-59/62/75	(1.41)	C	PCB-80	(1.48)	
PCB-6	(3.22)		PCB-28/20	[5.76]	J EMPC C	PCB-42	(2.12)		PCB-79	(1.43)	
PCB-5	(3.18)		PCB-21/33	(2.72)	C	PCB-41	(2.55)		PCB-78	(1.72)	
PCB-8	3.41	J	PCB-22	[1.94]	J EMPC	PCB-71/40	[2.03]	J EMPC C	PCB-81	(1.69)	
PCB-14	(2.68)		PCB-36	(2.67)		PCB-64	[2.25]	J EMPC	PCB-77	(1.79)	
PCB-11	[23.3]	B EMPC	PCB-39	(2.62)							
PCB-13/12	(3.08)	C	PCB-38	(2.76)							
PCB-15	(3.23)		PCB-35	(2.96)							
			PCB-37	(2.67)							
Conc.	3.41		**Conc.**	0					**Conc.**	41.7	
EMPC	26.7		**EMPC**	10.9					**EMPC**	45.9	

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Totals	Conc.	EMPC
Mono-Tri	3.41	37.6
Tetra-Hexa	241	270
Hepta-Deca	332	345
Mono-Deca	576	653

Sample ID: NTD-SW-East-0418 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.846)		PCB-108/119/86/97/125/87	6.97	J C	PCB-155	(0.669)		PCB-165	(0.819)	
PCB-96	(1.05)		PCB-117	(1.52)		PCB-152	(0.701)		PCB-146	5.96	J
PCB-103	(1.95)		PCB-116/85	(1.83)	C	PCB-150	(0.706)		PCB-161	(0.765)	
PCB-94	(2.25)		PCB-110	11.6		PCB-136	(0.732)		PCB-153/168	37	C
PCB-95	11.6		PCB-115	(1.49)		PCB-145	(0.771)		PCB-141	11	
PCB-100/93	(2.06)	C	PCB-82	(2.33)		PCB-148	(0.985)		PCB-130	(1.15)	
PCB-102	(1.93)		PCB-111	(1.46)		PCB-151/135	[5.26]	J EMPC C	PCB-137	(0.928)	
PCB-98	(2.22)		PCB-120	(1.4)		PCB-154	(0.893)		PCB-164	5.39	J
PCB-88	(2.18)		PCB-107/124	(1.54)	C	PCB-144	(1.02)		PCB-163/138/129	54.3	C
PCB-91	(1.93)		PCB-109	(1.39)		PCB-147/149	16.4	J C	PCB-160	(0.784)	
PCB-84	3.93	J	PCB-123	(1.51)		PCB-134	(1.58)		PCB-158	[4.7]	J EMPC
PCB-89	(2.25)		PCB-106	(1.54)		PCB-143	(0.866)		PCB-128/166	6.85	J C
PCB-121	(1.5)		PCB-118	9.27	J	PCB-139/140	(0.964)	C	PCB-159	1.82	J
PCB-92	(2.17)		PCB-122	(1.72)		PCB-131	(1.14)		PCB-162	(1.29)	
PCB-113/90/101	10.2	J C	PCB-114	(1.59)		PCB-142	(1.1)		PCB-167	2.13	J
PCB-83	(2.68)		PCB-105	[3.66]	J EMPC	PCB-132	[7.08]	J EMPC	PCB-156/157	4.52	J C
PCB-99	[4.12]	J EMPC	PCB-127	(1.6)		PCB-133	(1.01)		PCB-169	(1.69)	
PCB-112	(1.55)		PCB-126	(1.51)							
			Conc.	53.5					**Conc.**	145	
			EMPC	61.3					**EMPC**	163	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.584)		PCB-174	38.8		PCB-202	0.994	J	PCB-208	(1.35)	
PCB-179	[4]	J EMPC	PCB-177	20.4		PCB-201	(0.853)		PCB-207	(1.29)	
PCB-184	(0.712)		PCB-181	(1.82)		PCB-204	(0.891)		PCB-206	(3.09)	
PCB-176	(0.621)		PCB-171/173	10.5	J C	PCB-197	(0.826)				
PCB-186	(0.65)		PCB-172	6.09	J	PCB-200	(0.907)		**Conc.**	0	
PCB-178	5.23	J	PCB-192	(1.53)		PCB-198/199	15.8	J C	**EMPC**	0	
PCB-175	(1.84)		PCB-180/193	92.3	C	PCB-196	9.14	J			
PCB-187	30.3		PCB-191	(1.45)		PCB-203	9.75		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.65)		PCB-170	45.7		PCB-195	[6.85]	J EMPC	PCB-209	(2.06)	
PCB-183	18.9		PCB-190	8.55	J	PCB-194	19.5				
PCB-185	[2.62]	J EMPC	PCB-189	(0.969)		PCB-205	(1.57)				
			Conc.	277		**Conc.**	55.2				
			EMPC	283		**EMPC**	62				

Sample ID: NTD-SW-West-0418 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Sample ID:	B2138_15770_PCB_002-RJ
Date Collected:	05-Apr-2018	pH	6	QC Batch No.:	15770

Date Received:	06-Apr-2018
Date Extracted:	20-Apr-2018
Date Analyzed:	05-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	1.84			ES PCB-1	10.5 V
PCB-81 344'5-TeCB	ND	1.96			ES PCB-3	35.1
PCB-105 233'44'-PeCB	2.95			J	ES PCB-4	43.7
PCB-114 2344'5-PeCB	ND	1.2			ES PCB-15	173 V
PCB-118 23'44'5-PeCB	EMPC		6.21	J	ES PCB-19	111
PCB-123 23'44'5'-PeCB	ND	1.18			ES PCB-37	85.7
PCB-126 33'44'5-PeCB	ND	1.28			ES PCB-54	71.7
PCB-156/157 233'44'5/233'44'5'-HxCB	EMPC		3.43	J C	ES PCB-77	92.5
PCB-167 23'44'55'-HxCB	EMPC		1.73	J	ES PCB-81	93.8
PCB-169 33'44'55'-HxCB	ND	1.44			ES PCB-104	113
PCB-189 233'44'55'-HpCB	2.43			J	ES PCB-105	112
					ES PCB-114	104
TEQs (WHO 2005 M/H)					ES PCB-118	108
					ES PCB-123	114
ND = 0	0.000161		0.000502		ES PCB-126	101
ND = 0.5 x DL	0.0863		0.0866		ES PCB-153	98.8
ND = DL	0.172		0.173		ES PCB-155	88.5
					ES PCB-156/157	79.2
Totals					ES PCB-167	82.4
Mono-CB	ND	15.2			ES PCB-169	71.3
Di-CB	24				ES PCB-170	105
Tri-CB	15.6		33.9		ES PCB-180	105
Tetra-CB	40.5		61.2		ES PCB-188	119
Penta-CB	31.5		57.6		ES PCB-189	95.2
Hexa-CB	100		127		ES PCB-202	109
Hepta-CB	172		224		ES PCB-205	104
Octa-CB	9.96		34.7		ES PCB-206	104
Nona-CB	ND	3.33			ES PCB-208	109
Deca-CB	ND	2.27			ES PCB-209	122
					CS PCB-28	75.5
Total PCB (Mono-Deca)	394		562		CS PCB-111	101
					CS PCB-178	113

Checkcode: 536-509-NRW/A SGS North America - PCB v0.82 Report Created: 07-May-2018 07:04 Analyst: MS

Sample ID: NTD-SW-West-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.03 L	Sample ID:	B2138_15770_PCB_002-RJ	Date Extracted:	20-Apr-2018
Date Collected:	05-Apr-2018	pH	6	QC Batch No.:	15770	Date Analyzed:	05-May-2018
		Units	pg/L	Checkcode:	536-509-NRW/A	Time Analyzed:	22:02:46

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(22.5)		PCB-19	(12.4)		PCB-54	(1.42)		PCB-72	(1.92)	
PCB-2	(8.36)		PCB-30/18	[18.3]	J EMPC C	PCB-50/53	[6.65]	J EMPC C	PCB-68	(1.75)	
PCB-3	(7.81)		PCB-17	(11.5)		PCB-45	[3.8]	J EMPC	PCB-57	(1.98)	
			PCB-27	(8.39)		PCB-51	[2.01]	J EMPC	PCB-58	(1.95)	
Conc.	0		PCB-24	(8.78)		PCB-46	4.4	J	PCB-67	(1.86)	
EMPC	0		PCB-16	(15.2)		PCB-52	11.9		PCB-63	(1.76)	
			PCB-32	(7.86)		PCB-73	(1.67)		PCB-61/70/74/76	7.89	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(2.49)		PCB-43	(2.35)		PCB-66	[3.21]	J EMPC
PCB-4	(14.7)		PCB-23	(2.46)		PCB-69/49	[4.98]	J EMPC C	PCB-55	(2.02)	
PCB-10	(10.4)		PCB-26/29	(2.4)	C	PCB-48	(2.07)		PCB-56	(2)	
PCB-9	(4.04)		PCB-25	(2.39)		PCB-44/47/65	10.5	J C	PCB-60	(1.97)	
PCB-7	(3.45)		PCB-31	7.22	J	PCB-59/62/75	(1.48)	C	PCB-80	(1.72)	
PCB-6	(3.71)		PCB-28/20	8.35	J C	PCB-42	(2.23)		PCB-79	(1.66)	
PCB-5	(3.66)		PCB-21/33	(2.31)	C	PCB-41	(2.68)		PCB-78	(2)	
PCB-8	4.43	J	PCB-22	(2.52)		PCB-71/40	3.39	J C	PCB-81	(1.96)	
PCB-14	(3.08)		PCB-36	(2.27)		PCB-64	2.38	J	PCB-77	(1.84)	
PCB-11	16.4	B	PCB-39	(2.23)							
PCB-13/12	(3.55)	C	PCB-38	(2.34)							
PCB-15	3.18	J	PCB-35	(2.52)							
			PCB-37	(2.27)							
Conc.	24		**Conc.**	15.6					**Conc.**	40.5	
EMPC	24		**EMPC**	33.9					**EMPC**	61.2	

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Totals	Conc.	EMPC
Mono-Tri	39.6	57.9
Tetra-Hexa	172	246
Hepta-Deca	182	259
Mono-Deca	394	562

Sample ID: **NTD-SW-West-0418** **Method 1668A**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.87)		PCB-108/119/86/97/125/87	[5.32]	J EMPC C	PCB-155	(0.746)		PCB-165	(0.86)	
PCB-96	(1.08)		PCB-117	(1.19)		PCB-152	(0.781)		PCB-146	[4.16]	J EMPC
PCB-103	(1.53)		PCB-116/85	(1.43)	C	PCB-150	(0.787)		PCB-161	(0.804)	
PCB-94	(1.77)		PCB-110	[10.1]	EMPC	PCB-136	(0.816)		PCB-153/168	30.6	C
PCB-95	11.9		PCB-115	(1.17)		PCB-145	(0.859)		PCB-141	9.23	J
PCB-100/93	(1.62)	C	PCB-82	(1.83)		PCB-148	(1.04)		PCB-130	(1.21)	
PCB-102	(1.52)		PCB-111	(1.14)		PCB-151/135	[5.34]	J EMPC C	PCB-137	(0.975)	
PCB-98	(1.74)		PCB-120	(1.1)		PCB-154	(0.939)		PCB-164	[2.61]	J EMPC
PCB-88	(1.71)		PCB-107/124	(1.21)	C	PCB-144	(1.07)		PCB-163/138/129	41.7	C
PCB-91	2.15	J	PCB-109	(1.09)		PCB-147/149	13.4	J C	PCB-160	(0.824)	
PCB-84	5.58	J	PCB-123	(1.18)		PCB-134	(1.67)		PCB-158	[2.99]	J EMPC
PCB-89	(1.76)		PCB-106	(1.21)		PCB-143	(0.91)		PCB-128/166	5.23	J C
PCB-121	(1.18)		PCB-118	[6.21]	J EMPC	PCB-139/140	(1.01)	C	PCB-159	[1.34]	J EMPC
PCB-92	(1.71)		PCB-122	(1.3)		PCB-131	(1.19)		PCB-162	(1.02)	
PCB-113/90/101	8.88	J C	PCB-114	(1.2)		PCB-142	(1.16)		PCB-167	[1.73]	J EMPC
PCB-83	(2.1)		PCB-105	2.95	J	PCB-132	[5.17]	J EMPC	PCB-156/157	[3.43]	J EMPC C
PCB-99	[4.49]	J EMPC	PCB-127	(1.21)		PCB-133	(1.06)		PCB-169	(1.44)	
PCB-112	(1.22)		PCB-126	(1.28)							
			Conc.	31.5					**Conc.**	100	
			EMPC	57.6					**EMPC**	127	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.638)		PCB-174	30.4		PCB-202	(0.986)		PCB-208	(1.98)	
PCB-179	[2.69]	J EMPC	PCB-177	17		PCB-201	(0.956)		PCB-207	(1.89)	
PCB-184	(0.778)		PCB-181	(1.91)		PCB-204	(0.998)		PCB-206	(4.69)	
PCB-176	(0.679)		PCB-171/173	[8.44]	J EMPC C	PCB-197	(0.925)				
PCB-186	(0.711)		PCB-172	[5.34]	J EMPC	PCB-200	(1.02)		**Conc.**	0	
PCB-178	3.32	J	PCB-192	(1.61)		PCB-198/199	[8.24]	J EMPC C	**EMPC**	0	
PCB-175	(1.93)		PCB-180/193	73.7	C	PCB-196	4.38	J			
PCB-187	[22.3]	EMPC	PCB-191	(1.52)		PCB-203	5.58	J	**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.73)		PCB-170	38.9		PCB-195	[5.41]	J EMPC	PCB-209	(2.27)	
PCB-183	[11.6]	EMPC	PCB-190	6.36	J	PCB-194	[11.1]	EMPC			
PCB-185	[1.44]	J EMPC	PCB-189	2.43	J	PCB-205	(2)				
			Conc.	172		**Conc.**	9.96				
			EMPC	224		**EMPC**	34.7				

Sample ID: NTD-SW-3"-0418 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.05 L	Sample ID:	B2138_15770_PCB_003	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH	6	QC Batch No.:	15770	Date Analyzed:	05-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	2.54			ES PCB-1	34.7
PCB-81 344'5-TeCB	ND	2.48			ES PCB-3	52.1
PCB-105 233'44'-PeCB	ND	1.5			ES PCB-4	58
PCB-114 2344'5-PeCB	ND	1.44			ES PCB-15	144
PCB-118 23'44'5-PeCB	EMPC		3.26	J	ES PCB-19	102
PCB-123 23'44'5'-PeCB	ND	1.44			ES PCB-37	82.1
PCB-126 33'44'5-PeCB	ND	1.82			ES PCB-54	62.9
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	2.33		C	ES PCB-77	88.9
PCB-167 23'44'55'-HxCB	ND	1.49			ES PCB-81	90.4
PCB-169 33'44'55'-HxCB	ND	1.94			ES PCB-104	101
PCB-189 233'44'55'-HpCB	ND	1.58			ES PCB-105	101
					ES PCB-114	90.2
TEQs (WHO 2005 M/H)					ES PCB-118	97.5
					ES PCB-123	103
ND = 0	0		0.0000979		ES PCB-126	90.2
ND = 0.5 x DL	0.121		0.121		ES PCB-153	92.3
ND = DL	0.242		0.242		ES PCB-155	87.4
					ES PCB-156/157	76.6
Totals					ES PCB-167	78.5
Mono-CB	ND	8.62			ES PCB-169	73.4
Di-CB	15.8				ES PCB-170	88.1
Tri-CB	ND	10.5			ES PCB-180	86
Tetra-CB	11.6		15.7		ES PCB-188	108
Penta-CB			21.6		ES PCB-189	86.8
Hexa-CB	12.8		22.8		ES PCB-202	104
Hepta-CB			4.12		ES PCB-205	100
Octa-CB	ND	1.66			ES PCB-206	103
Nona-CB	ND	3.58			ES PCB-208	96.9
Deca-CB	ND	3.73			ES PCB-209	124
					CS PCB-28	71.1
Total PCB (Mono-Deca)	40.2		80		CS PCB-111	87.8
					CS PCB-178	95.2

Checkcode: 421-525-HCD/A SGS North America - PCB v0.82 Report Created: 07-May-2018 07:03 Analyst: MS

Sample ID: NTD-SW-3"-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.05 L	Sample ID:	B2138_15770_PCB_003	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH	6	QC Batch No.:	15770	Date Analyzed:	05-May-2018
		Units	pg/L	Checkcode:	421-525-HCD/A	Time Analyzed:	02:35:22

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(10.1)		PCB-19	(15.9)		PCB-54	(2.84)		PCB-72	(2.21)	
PCB-2	(6.86)		PCB-30/18	(12.2)	C	PCB-50/53	(2.85)	C	PCB-68	(2.05)	
PCB-3	(7.18)		PCB-17	(14.1)		PCB-45	(3.46)		PCB-57	(2.36)	
			PCB-27	(10.4)		PCB-51	(2.64)		PCB-58	(2.24)	
Conc.	0		PCB-24	(10.9)		PCB-46	(3.51)		PCB-67	(2.15)	
EMPC	0		PCB-16	(18.9)		PCB-52	[4.13]	J EMPC	PCB-63	(2.08)	
			PCB-32	(9.76)		PCB-73	(2.19)		PCB-61/70/74/76	5.42	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(4.82)		PCB-43	(3.51)		PCB-66	(2.29)	
PCB-4	(19.1)		PCB-23	(4.79)		PCB-69/49	(2.4)	C	PCB-55	(2.36)	
PCB-10	(12.5)		PCB-26/29	(4.74)	C	PCB-48	(2.96)		PCB-56	(2.38)	
PCB-9	(5.78)		PCB-25	(4.68)		PCB-44/47/65	6.16	J C	PCB-60	(2.29)	
PCB-7	(5.22)		PCB-31	(4.43)		PCB-59/62/75	(2.12)	C	PCB-80	(2.02)	
PCB-6	(5.59)		PCB-28/20	(4.7)	C	PCB-42	(3.15)		PCB-79	(1.95)	
PCB-5	(5.48)		PCB-21/33	(4.59)	C	PCB-41	(3.88)		PCB-78	(2.43)	
PCB-8	(5.24)		PCB-22	(5.12)		PCB-71/40	(2.76)	C	PCB-81	(2.48)	
PCB-14	(4.58)		PCB-36	(4.45)		PCB-64	(1.97)		PCB-77	(2.54)	
PCB-11	15.8	B	PCB-39	(4.44)							
PCB-13/12	(5.29)	C	PCB-38	(4.84)							
PCB-15	(6.01)		PCB-35	(5.07)							
			PCB-37	(4.99)							
Conc.	15.8		**Conc.**	0					**Conc.**	11.6	
EMPC	15.8		**EMPC**	0					**EMPC**	15.7	

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Totals	**Conc.**	**EMPC**
Mono-Tri	15.8	15.8
Tetra-Hexa	24.4	60.1
Hepta-Deca	0	4.12
Mono-Deca	40.2	80

Sample ID: NTD-SW-3"-0418 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.34)		PCB-108/119/86/97/125/87	(1.53)	C	PCB-155	(1.19)		PCB-165	(1.18)	
PCB-96	(1.5)		PCB-117	(1.38)		PCB-152	(1.17)		PCB-146	(1.33)	
PCB-103	(1.7)		PCB-116/85	(1.63)	C	PCB-150	(1.17)		PCB-161	(1.07)	
PCB-94	(1.97)		PCB-110	[6.32]	J EMPC	PCB-136	(1.28)		PCB-153/168	6.14	J C
PCB-95	[5.34]	J EMPC	PCB-115	(1.3)		PCB-145	(1.27)		PCB-141	(1.46)	
PCB-100/93	(1.75)	C	PCB-82	(2.18)		PCB-148	(1.39)		PCB-130	(1.63)	
PCB-102	(1.69)		PCB-111	(1.27)		PCB-151/135	(1.46)	C	PCB-137	(1.36)	
PCB-98	(1.88)		PCB-120	(1.26)		PCB-154	(1.25)		PCB-164	(1.08)	
PCB-88	(1.94)		PCB-107/124	(1.4)	C	PCB-144	(1.41)		PCB-163/138/129	[6.61]	J EMPC C
PCB-91	(1.61)		PCB-109	(1.28)		PCB-147/149	6.68	J C	PCB-160	(1.1)	
PCB-84	(2.12)		PCB-123	(1.44)		PCB-134	(1.78)		PCB-158	(0.991)	
PCB-89	(2.03)		PCB-106	(1.39)		PCB-143	(1.43)		PCB-128/166	(1.55)	C
PCB-121	(1.34)		PCB-118	[3.26]	J EMPC	PCB-139/140	(1.39)	C	PCB-159	(1.29)	
PCB-92	(1.93)		PCB-122	(1.52)		PCB-131	(1.59)		PCB-162	(1.33)	
PCB-113/90/101	[6.65]	J EMPC C	PCB-114	(1.44)		PCB-142	(1.59)		PCB-167	(1.49)	
PCB-83	(2.45)		PCB-105	(1.5)		PCB-132	[3.42]	J EMPC	PCB-156/157	(2.33)	C
PCB-99	(1.54)		PCB-127	(1.39)		PCB-133	(1.41)		PCB-169	(1.94)	
PCB-112	(1.41)		PCB-126	(1.82)							
			Conc.	0					**Conc.**	12.8	
			EMPC	21.6					**EMPC**	22.8	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.961)		PCB-174	(1.79)		PCB-202	(1.22)		PCB-208	(2.33)	
PCB-179	(1.01)		PCB-177	(1.86)		PCB-201	(1.14)		PCB-207	(2.05)	
PCB-184	(1.05)		PCB-181	(1.67)		PCB-204	(1.2)		PCB-206	(4.83)	
PCB-176	(0.953)		PCB-171/173	(1.93)	C	PCB-197	(1.13)				
PCB-186	(1.02)		PCB-172	(1.85)		PCB-200	(1.2)		**Conc.**	0	
PCB-178	(1.34)		PCB-192	(1.44)		PCB-198/199	(1.61)	C	**EMPC**	0	
PCB-175	(1.72)		PCB-180/193	[2.58]	J EMPC C	PCB-196	(1.57)				
PCB-187	[1.55]	J EMPC	PCB-191	(1.35)		PCB-203	(1.51)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.57)		PCB-170	(1.86)		PCB-195	(2.5)		PCB-209	(3.73)	
PCB-183	(1.53)		PCB-190	(1.31)		PCB-194	(2.44)				
PCB-185	(1.78)		PCB-189	(1.58)		PCB-205	(2.09)				
			Conc.	0		**Conc.**	0				
			EMPC	4.12		**EMPC**	0				

Sample ID: NTD-SW-8"-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.02 L	Sample ID:	B2138_15770_PCB_004	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH	4	QC Batch No.:	15770	Date Analyzed:	05-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	2.72			ES PCB-1	18.9
PCB-81 344'5-TeCB	ND	2.64			ES PCB-3	45.7
PCB-105 233'44'-PeCB	8.23			J	ES PCB-4	55.2
PCB-114 2344'5-PeCB	ND	2.27			ES PCB-15	127
PCB-118 23'44'5-PeCB	19.8				ES PCB-19	98.2
PCB-123 23'44'5'-PeCB	ND	2.01			ES PCB-37	85.9
PCB-126 33'44'5-PeCB	ND	1.79			ES PCB-54	91.8
PCB-156/157 233'44'5/233'44'5'-HxCB	3.4			J C	ES PCB-77	85.2
PCB-167 23'44'55'-HxCB	ND	1.7			ES PCB-81	87.3
PCB-169 33'44'55'-HxCB	ND	2.05			ES PCB-104	120
PCB-189 233'44'55'-HpCB	ND	1.69			ES PCB-105	103
					ES PCB-114	91.4
TEQs (WHO 2005 M/H)					ES PCB-118	99.3
					ES PCB-123	104
ND = 0	0.000942		0.000942		ES PCB-126	92.3
ND = 0.5 x DL	0.122		0.122		ES PCB-153	101
ND = DL	0.243		0.243		ES PCB-155	102
					ES PCB-156/157	82.8
Totals					ES PCB-167	83.7
Mono-CB	ND	7.76			ES PCB-169	72.2
Di-CB	25.2				ES PCB-170	94.4
Tri-CB	42.3				ES PCB-180	97.2
Tetra-CB	73.3		87.4		ES PCB-188	118
Penta-CB	89.6		115		ES PCB-189	91.7
Hexa-CB	31.4		69.8		ES PCB-202	112
Hepta-CB			4.86		ES PCB-205	105
Octa-CB	ND	2.2			ES PCB-206	109
Nona-CB	ND	3.77			ES PCB-208	103
Deca-CB	ND	3.47			ES PCB-209	127
					CS PCB-28	85.9
Total PCB (Mono-Deca)	262		344		CS PCB-111	90.4
					CS PCB-178	104

Checkcode: 985-042-DCJ/A SGS North America - PCB v0.82 Report Created: 07-May-2018 07:03 Analyst: MS

Sample ID: NTD-SW-8"-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.02 L	Sample ID:	B2138_15770_PCB_004	Date Extracted:	20-Apr-2018
Date Collected:	04-Apr-2018	pH	4	QC Batch No.:	15770	Date Analyzed:	05-May-2018
		Units	pg/L	Checkcode:	985-042-DCJ/A	Time Analyzed:	03:34:50

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(10.6)		PCB-19	(12.7)		PCB-54	(2.46)		PCB-72	(2.35)	
PCB-2	(4.7)		PCB-30/18	(9.75)	C	PCB-50/53	(3.61)	C	PCB-68	(2.18)	
PCB-3	(4.92)		PCB-17	(11.3)		PCB-45	(4.39)		PCB-57	(2.51)	
			PCB-27	(8.29)		PCB-51	(3.35)		PCB-58	(2.39)	
Conc.	0		PCB-24	(8.76)		PCB-46	(4.45)		PCB-67	(2.29)	
EMPC	0		PCB-16	(15.1)		PCB-52	14.5		PCB-63	(2.21)	
			PCB-32	(7.81)		PCB-73	(2.78)		PCB-61/70/74/76	21.7	J C
Di	**Conc.**	**Qualifiers**	PCB-34	(5.35)		PCB-43	(4.45)		PCB-66	9.61	J
PCB-4	(8.71)		PCB-23	(5.31)		PCB-69/49	9.36	J C	PCB-55	(2.51)	
PCB-10	(5.7)		PCB-26/29	(5.25)	C	PCB-48	3.49	J	PCB-56	[3.62]	J EMPC
PCB-9	(5.39)		PCB-25	(5.19)		PCB-44/47/65	14.6	J C	PCB-60	(2.44)	
PCB-7	(4.86)		PCB-31	12		PCB-59/62/75	(2.68)	C	PCB-80	(2.15)	
PCB-6	(5.21)		PCB-28/20	14.2	J C	PCB-42	(4)		PCB-79	(2.07)	
PCB-5	(5.11)		PCB-21/33	10.1	J C	PCB-41	(4.92)		PCB-78	(2.58)	
PCB-8	(4.89)		PCB-22	6.04	J	PCB-71/40	[6.34]	J EMPC C	PCB-81	(2.64)	
PCB-14	(4.27)		PCB-36	(4.94)		PCB-64	[4.1]	J EMPC	PCB-77	(2.72)	
PCB-11	25.2	B	PCB-39	(4.92)							
PCB-13/12	(4.93)	C	PCB-38	(5.37)							
PCB-15	(5.6)		PCB-35	(5.63)							
			PCB-37	(5.54)							
Conc.	25.2		**Conc.**	42.3					**Conc.**	73.3	
EMPC	25.2		**EMPC**	42.3					**EMPC**	87.4	

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Totals	**Conc.**	**EMPC**
Mono-Tri	67.6	67.6
Tetra-Hexa	194	272
Hepta-Deca	0	4.86
Mono-Deca	262	344

Sample ID: **NTD-SW-8"-0418** **Method 1668A**

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.28)		PCB-108/119/86/97/125/87	16.7	J C	PCB-155	(1.17)		PCB-165	(1.3)	
PCB-96	2.27	J	PCB-117	(1.92)		PCB-152	(1.16)		PCB-146	(1.46)	
PCB-103	(2.36)		PCB-116/85	[4.61]	J EMPC C	PCB-150	(1.16)		PCB-161	(1.18)	
PCB-94	(2.73)		PCB-110	[20.4]	EMPC	PCB-136	2.85	J	PCB-153/168	12.8	J C
PCB-95	12.3		PCB-115	(1.81)		PCB-145	(1.26)		PCB-141	[3.17]	J EMPC
PCB-100/93	(2.43)	C	PCB-82	(3.02)		PCB-148	(1.53)		PCB-130	(1.8)	
PCB-102	(2.35)		PCB-111	(1.76)		PCB-151/135	6.13	J C	PCB-137	(1.5)	
PCB-98	(2.61)		PCB-120	(1.74)		PCB-154	(1.38)		PCB-164	(1.19)	
PCB-88	(2.7)		PCB-107/124	(1.94)	C	PCB-144	(1.56)		PCB-163/138/129	[15.8]	J EMPC C
PCB-91	(2.24)		PCB-109	(1.77)		PCB-147/149	[13.5]	J EMPC C	PCB-160	(1.21)	
PCB-84	(2.94)		PCB-123	(2.01)		PCB-134	(1.96)		PCB-158	[2.76]	J EMPC
PCB-89	(2.82)		PCB-106	(1.93)		PCB-143	(1.58)		PCB-128/166	[3.17]	J EMPC C
PCB-121	(1.86)		PCB-118	19.8		PCB-139/140	(1.53)	C	PCB-159	(1.47)	
PCB-92	3.94	J	PCB-122	(2.41)		PCB-131	(1.75)		PCB-162	(1.52)	
PCB-113/90/101	19.1	J C	PCB-114	(2.27)		PCB-142	(1.76)		PCB-167	(1.7)	
PCB-83	(3.4)		PCB-105	8.23	J	PCB-132	6.18	J	PCB-156/157	3.4	J C
PCB-99	7.31	J	PCB-127	(2.13)		PCB-133	(1.56)		PCB-169	(2.05)	
PCB-112	(1.95)		PCB-126	(1.79)							
			Conc.	89.6					**Conc.**	31.4	
			EMPC	115					**EMPC**	69.8	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.01)		PCB-174	(2.37)		PCB-202	(1.4)		PCB-208	(2.39)	
PCB-179	(1.06)		PCB-177	(2.46)		PCB-201	(1.31)		PCB-207	(2.11)	
PCB-184	(1.1)		PCB-181	(2.21)		PCB-204	(1.38)		PCB-206	(5.15)	
PCB-176	(1)		PCB-171/173	(2.56)	C	PCB-197	(1.3)				
PCB-186	(1.07)		PCB-172	(2.45)		PCB-200	(1.37)		**Conc.**	0	
PCB-178	(1.41)		PCB-192	(1.91)		PCB-198/199	(1.85)	C	**EMPC**	0	
PCB-175	(2.28)		PCB-180/193	[4.86]	J EMPC C	PCB-196	(1.8)				
PCB-187	(2.13)		PCB-191	(1.79)		PCB-203	(1.73)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.08)		PCB-170	(2.56)		PCB-195	(3.59)		PCB-209	(3.47)	
PCB-183	(2.04)		PCB-190	(1.81)		PCB-194	(3.51)				
PCB-185	(2.36)		PCB-189	(1.69)		PCB-205	(3)				
			Conc.	0		**Conc.**	0				
			EMPC	4.86		**EMPC**	0				

Sample ID: Method Blank B2138_15770

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.00 L	Sample ID:	MB1_15770_PCB_SDS	Date Extracted:	20-Apr-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	15770	Date Analyzed:	04-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/L	pg/L	pg/L			%
PCB-77 33'44'-TeCB	ND	3.93			ES PCB-1	22.8
PCB-81 344'5-TeCB	ND	4.18			ES PCB-3	33.4
PCB-105 233'44'-PeCB	ND	3.36			ES PCB-4	39.5
PCB-114 2344'5-PeCB	ND	3.26			ES PCB-15	78.5
PCB-118 23'44'5-PeCB	ND	3.17			ES PCB-19	62.7
PCB-123 23'44'5'-PeCB	ND	3.21			ES PCB-37	62.2
PCB-126 33'44'5-PeCB	ND	3.72			ES PCB-54	56.4
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	4.66		C	ES PCB-77	75.3
PCB-167 23'44'55'-HxCB	ND	3.41			ES PCB-81	78.2
PCB-169 33'44'55'-HxCB	ND	4.19			ES PCB-104	82.4
PCB-189 233'44'55'-HpCB	ND	2.9			ES PCB-105	88.4
					ES PCB-114	81.7
TEQs (WHO 2005 M/H)					ES PCB-118	91.4
					ES PCB-123	93.3
ND = 0	0		0		ES PCB-126	81.8
ND = 0.5 x DL	0.25		0.25		ES PCB-153	84.7
ND = DL	0.5		0.5		ES PCB-155	77.5
					ES PCB-156/157	73.7
Totals					ES PCB-167	71.6
Mono-CB	ND	13.3			ES PCB-169	66.7
Di-CB	14.3				ES PCB-170	83.7
Tri-CB	ND	24.3			ES PCB-180	91.6
Tetra-CB	ND	5.4			ES PCB-188	102
Penta-CB	ND	3.29			ES PCB-189	84.3
Hexa-CB	ND	3.55			ES PCB-202	96.2
Hepta-CB	ND	3.03			ES PCB-205	98
Octa-CB	ND	3.82			ES PCB-206	103
Nona-CB	ND	7.2			ES PCB-208	96.5
Deca-CB	ND	6.73			ES PCB-209	122
					CS PCB-28	89.3
Total PCB (Mono-Deca)	14.3		14.3		CS PCB-111	95
					CS PCB-178	106

Checkcode: 497-154-FXV/A SGS North America - PCB v0.82 Report Created: 05-May-2018 17:30 Analyst: MS

Sample ID: Method Blank B2138_15770

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Aqueous	Project No.:	B2138	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	1.00 L	Sample ID:	MB1_15770_PCB_SDS	Date Extracted:	20-Apr-2018
Date Collected:	n/a	pH	n/a	QC Batch No.:	15770	Date Analyzed:	04-May-2018
		Units	pg/L	Checkcode:	497-154-FXV/A	Time Analyzed:	23:37:03

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(14.6)		PCB-19	(37.8)		PCB-54	(6.08)		PCB-72	(3.72)	
PCB-2	(11.5)		PCB-30/18	(28.9)	C	PCB-50/53	(6.4)	C	PCB-68	(3.46)	
PCB-3	(12)		PCB-17	(33.5)		PCB-45	(7.77)		PCB-57	(3.97)	
			PCB-27	(24.6)		PCB-51	(5.93)		PCB-58	(3.78)	
Conc.	0		PCB-24	(26)		PCB-46	(7.89)		PCB-67	(3.62)	
EMPC	0		PCB-16	(44.8)		PCB-52	(6.4)		PCB-63	(3.51)	
			PCB-32	(23.1)		PCB-73	(4.92)		PCB-61/70/74/76	(3.7)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(10.4)		PCB-43	(7.88)		PCB-66	(3.86)	
PCB-4	(22.4)		PCB-23	(10.3)		PCB-69/49	(5.39)	C	PCB-55	(3.98)	
PCB-10	(14.7)		PCB-26/29	(10.2)	C	PCB-48	(6.65)		PCB-56	(4.02)	
PCB-9	(14.3)		PCB-25	(10.1)		PCB-44/47/65	(6.01)	C	PCB-60	(3.86)	
PCB-7	(12.9)		PCB-31	(9.53)		PCB-59/62/75	(4.76)	C	PCB-80	(3.41)	
PCB-6	(13.8)		PCB-28/20	(10.1)	C	PCB-42	(7.09)		PCB-79	(3.28)	
PCB-5	(13.5)		PCB-21/33	(9.87)	C	PCB-41	(8.71)		PCB-78	(4.09)	
PCB-8	(13)		PCB-22	(11)		PCB-71/40	(6.2)	C	PCB-81	(4.18)	
PCB-14	(11.3)		PCB-36	(9.57)		PCB-64	(4.42)		PCB-77	(3.93)	
PCB-11	14.3		PCB-39	(9.55)							
PCB-13/12	(13.1)	C	PCB-38	(10.4)							
PCB-15	(14.8)		PCB-35	(10.9)							
			PCB-37	(10.7)							
Conc.	14.3		**Conc.**	0					**Conc.**	0	
EMPC	14.3		**EMPC**	0					**EMPC**	0	

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Totals	**Conc.**	**EMPC**
Mono-Tri	14.3	14.3
Tetra-Hexa	0	0
Hepta-Deca	0	0
Mono-Deca	14.3	14.3

Sample ID: Method Blank B2138_15770

Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(3.02)		PCB-108/119/86/97/125/87	(3.4)	C	PCB-155	(1.95)		PCB-165	(2.22)	
PCB-96	(3.38)		PCB-117	(3.08)		PCB-152	(1.92)		PCB-146	(2.5)	
PCB-103	(3.79)		PCB-116/85	(3.63)	C	PCB-150	(1.92)		PCB-161	(2.02)	
PCB-94	(4.38)		PCB-110	(3.07)		PCB-136	(2.1)		PCB-153/168	(2.09)	C
PCB-95	(4.07)		PCB-115	(2.9)		PCB-145	(2.09)		PCB-141	(2.74)	
PCB-100/93	(3.89)	C	PCB-82	(4.85)		PCB-148	(2.6)		PCB-130	(3.06)	
PCB-102	(3.77)		PCB-111	(2.82)		PCB-151/135	(2.74)	C	PCB-137	(2.55)	
PCB-98	(4.19)		PCB-120	(2.79)		PCB-154	(2.35)		PCB-164	(2.03)	
PCB-88	(4.33)		PCB-107/124	(3.11)	C	PCB-144	(2.66)		PCB-163/138/129	(2.53)	C
PCB-91	(3.59)		PCB-109	(2.84)		PCB-147/149	(2.64)	C	PCB-160	(2.07)	
PCB-84	(4.72)		PCB-123	(3.21)		PCB-134	(3.34)		PCB-158	(1.86)	
PCB-89	(4.52)		PCB-106	(3.1)		PCB-143	(2.7)		PCB-128/166	(3.53)	C
PCB-121	(2.99)		PCB-118	(3.17)		PCB-139/140	(2.61)	C	PCB-159	(2.95)	
PCB-92	(4.29)		PCB-122	(3.46)		PCB-131	(2.98)		PCB-162	(3.05)	
PCB-113/90/101	(3.45)	C	PCB-114	(3.26)		PCB-142	(3)		PCB-167	(3.41)	
PCB-83	(5.44)		PCB-105	(3.36)		PCB-132	(2.85)		PCB-156/157	(4.66)	C
PCB-99	(3.44)		PCB-127	(3.1)		PCB-133	(2.66)		PCB-169	(4.19)	
PCB-112	(3.13)		PCB-126	(3.72)							
			Conc.	0					**Conc.**	0	
			EMPC	0					**EMPC**	0	
Hepta	**Conc.**	**Qualifiers**	**Hepta**	**Conc.**	**Qualifiers**	**Octa**	**Conc.**	**Qualifiers**	**Nona**	**Conc.**	**Qualifiers**
PCB-188	(1.77)		PCB-174	(3.73)		PCB-202	(3.02)		PCB-208	(4.58)	
PCB-179	(1.86)		PCB-177	(3.87)		PCB-201	(2.83)		PCB-207	(4.04)	
PCB-184	(1.93)		PCB-181	(3.48)		PCB-204	(2.98)		PCB-206	(9.83)	
PCB-176	(1.75)		PCB-171/173	(4.03)	C	PCB-197	(2.81)				
PCB-186	(1.87)		PCB-172	(3.86)		PCB-200	(2.96)		**Conc.**	0	
PCB-178	(2.47)		PCB-192	(3)		PCB-198/199	(3.99)	C	**EMPC**	0	
PCB-175	(3.59)		PCB-180/193	(3.11)	C	PCB-196	(3.88)				
PCB-187	(3.34)		PCB-191	(2.81)		PCB-203	(3.74)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(3.27)		PCB-170	(3.63)		PCB-195	(5.54)		PCB-209	(6.73)	
PCB-183	(3.2)		PCB-190	(2.56)		PCB-194	(5.4)				
PCB-185	(3.71)		PCB-189	(2.9)		PCB-205	(4.62)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM7_PCB_06072017_03MAR2018		
Instrument ID:	MM7	GC Column ID:	
VER Data Filename:	180504X02	Analysis Date:	04-MAY-2018 22:38:51
Lab ID:	OPR1_15770_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	110	50	-	150	Y
PCB-3 4-MoCB	50	97.4	50	-	150	Y
PCB-4 22'-DiCB	50	99.9	50	-	150	Y
PCB-15 44'-DiCB	50	113	50	-	150	Y
PCB-19 22'6-TrCB	50	99.5	50	-	150	Y
PCB-37 344'-TrCB	50	103	50	-	150	Y
PCB-54 22'66'-TeCB	50	93.4	50	-	150	Y
PCB-77 33'44'-TeCB	50	110	50	-	150	Y
PCB-81 344'5-TeCB	50	112	50	-	150	Y
PCB-104 22'466'-PeCB	50	101	50	-	150	Y
PCB-105 233'44'-PeCB	50	104	50	-	150	Y
PCB-114 2344'5-PeCB	50	111	50	-	150	Y
PCB-118 23'44'5-PeCB	50	102	50	-	150	Y
PCB-123 23'44'5'-PeCB	50	109	50	-	150	Y
PCB-126 33'44'5-PeCB	50	121	50	-	150	Y
PCB-155 22'44'66'-HxCB	50	101	50	-	150	Y
PCB-156/157 ...-HxCB	100	111	50	-	150	Y
PCB-167 23'44'55'-HxCB	50	115	50	-	150	Y
PCB-169 33'44'55'-HxCB	50	113	50	-	150	Y
PCB-188 22'34'566'-HpCB	50	93	50	-	150	Y
PCB-189 233'44'55'-HpCB	50	116	50	-	150	Y
PCB-202 22'33'55'66'-OcCB	50	92.8	50	-	150	Y
PCB-205 233'44'55'6-OcCB	50	100	50	-	150	Y
PCB-206 22'33'44'55'6-NoCB	50	106	50	-	150	Y
PCB-208 22'33'455'66'-NoCB	50	110	50	-	150	Y
PCB-209 DeCB	50	105	50	-	150	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668A.

Processed: 07 May 2018 07:02 Analyst: MS

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM7_PCB_06072017_03MAR2018		
Instrument ID:	MM7	GC Column ID:	
VER Data Filename:	180504X02	Analysis Date:	04-MAY-2018 22:38:51
Lab ID:	OPR1_15770_PCB		

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	6.02	15	-	140	N
ES PCB-3	100	26.3	15	-	140	Y
ES PCB-4	100	33.8	30	-	140	Y
ES PCB-15	100	159	30	-	140	N
ES PCB-19	100	102	30	-	140	Y
ES PCB-37	100	79.3	30	-	140	Y
ES PCB-54	100	74.2	30	-	140	Y
ES PCB-77	100	85.3	30	-	140	Y
ES PCB-81	100	83	30	-	140	Y
ES PCB-104	100	112	30	-	140	Y
ES PCB-105	100	98.4	30	-	140	Y
ES PCB-114	100	89.8	30	-	140	Y
ES PCB-118	100	97.8	30	-	140	Y
ES PCB-123	100	98	30	-	140	Y
ES PCB-126	100	88.4	30	-	140	Y
ES PCB-153	100	93.8	30	-	140	Y
ES PCB-155	100	95.3	30	-	140	Y
ES PCB-156/157	200	79.1	30	-	140	Y
ES PCB-167	100	79	30	-	140	Y
ES PCB-169	100	75.4	30	-	140	Y
ES PCB-170	100	84.7	30	-	140	Y
ES PCB-180	100	89	30	-	140	Y
ES PCB-188	100	119	30	-	140	Y
ES PCB-189	100	85.5	30	-	140	Y
ES PCB-202	100	102	30	-	140	Y
ES PCB-205	100	99.1	30	-	140	Y
ES PCB-206	100	97.6	30	-	140	Y
ES PCB-208	100	96.1	30	-	140	Y
ES PCB-209	100	122	30	-	140	Y
CLEANUP STANDARDS						
CS PCB-28	100	87.3	40	-	125	Y
CS PCB-111	100	97.6	40	-	125	Y
CS PCB-178	100	109	40	-	125	Y

Processed: 07 May 2018 07:02 Analyst: MS

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*06-Apr-18 at 09:45*
AP Project name:	*B2138*
Requested TAT:	*21 days*
Projected due date:	*27-Apr-18*
Matrix:	*Aqueous*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Former E.A. Nord Door Site*
Project PO#:	*108.00228.00048*
QAAP/Contract #:	*N/A*
Requested Analysis:	*Methods 8290A & 1668A*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
NTD-SW-East-0418	B2138_001	WT	2	1-Liter Amber	05-Apr-18	07:55	3.6	1	7804 0160 2070
NTD-SW-West-0418	B2138_002	WT	2	1-Liter Amber	05-Apr-18	08:30	3.6	1	7804 0160 2070
NTD-SW-3"-0418	B2138_003	WT	2	1-Liter Amber	04-Apr-18	10:50	3.6	1	7804 0160 2070
NTD-SW-8"-0418	B2138_004	WT	2	1-Liter Amber	04-Apr-18	11:15	3.6	1	7804 0160 2070

Preservation Type:

Sample Seals: No

Notes/Comments:

Samples received intact.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens

Logged in by: Ashley Owens

QC'ed by: AK 10 Apr 18

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B2138

SGS

CHAIN OF CUSTODY

PROJECT INFO

PROJECT: Former E.A. Nord Door Site
P.O. #: 108.00228.00048
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

SEND DOCUMENTATION / RESULTS TO

COMPANY: SLR consulting
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd. Ste 440
West Linn, OR 97068
PHONE: 503-723-4423
EMAIL: ckramer@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

					PRESERVATIVE												
					ANALYSIS & METHOD												
SAMPLE ID / DESCRIPTION	**DATE**	**TIME**	**QTY**	**MATRIX**	dioxins/furans		PCB congeners								**MS MSD**	**MS/ DUP**	**REMARKS**
NTD-SW-East-0418	4/5/18	755	2	WT	X		X										
NTD-SW-West-0418	4/5/18	830	2	WT	X		X										
NTD-SW-3"-0418	4/4/18	1050	2	WT	X		X										
NTD-SW-8"-0418	4/4/18	1115	2	WT	X		X										

COLLECTED/RELINQUISHED BY (1):	**DATE:** 4/5/18	**TIME:** 230pm	**RECEIVED BY:**
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY (3):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: ashley Owens DATE: 4/6/18 TIME: 9:45
COOLER SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: FedEx TEMP: °C 3.6° (T.B.)
TRACKING #: 7804 0160 2070

ANALYTICAL REPORT

April 18, 2018

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L983742
Samples Received:	04/06/2018
Project Number:	108.00228.00048
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Technical Service Representative

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SAMPLE SUMMARY

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

NTD-SW-EAST-0418 L983742-01 GW

Collected by	Collected date/time	Received date/time
RFK-SL	04/05/18 07:55	04/06/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1094985	1	04/07/18 04:05	04/07/18 04:05	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1094913	1	04/07/18 13:32	04/16/18 21:33	LM
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1095399	1	04/08/18 18:25	04/09/18 04:02	KM

NTD-SW-WEST-0418 L983742-02 GW

Collected by	Collected date/time	Received date/time
RFK-SL	04/05/18 08:30	04/06/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1094985	1	04/07/18 04:26	04/07/18 04:26	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1094913	1	04/07/18 13:32	04/14/18 01:18	AAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1095399	1	04/08/18 18:25	04/09/18 04:26	KM

NTD-SW-3"-0418 L983742-03 GW

Collected by	Collected date/time	Received date/time
RFK-SL	04/04/18 10:50	04/06/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1094985	1	04/07/18 04:48	04/07/18 04:48	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1094913	1	04/07/18 13:32	04/14/18 01:34	AAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1095399	1	04/08/18 18:25	04/09/18 04:50	KM

NTD-SW-8"-0418 L983742-04 GW

Collected by	Collected date/time	Received date/time
RFK-SL	04/04/18 11:15	04/06/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1094985	1	04/07/18 05:09	04/07/18 05:09	BMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1094913	1	04/07/18 13:32	04/14/18 01:50	AAT
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1095399	1	04/08/18 18:25	04/09/18 05:13	KM

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Technical Service Representative

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	04/07/2018 04:05	WG1094985
Naphthalene	5.94		0.174	2.50	1	04/07/2018 04:05	WG1094985
(S) Toluene-d8	*98.1*			*80.0-120*		*04/07/2018 04:05*	WG1094985
(S) Dibromofluoromethane	*112*			*76.0-123*		*04/07/2018 04:05*	WG1094985
(S) 4-Bromofluorobenzene	*89.9*			*80.0-120*		*04/07/2018 04:05*	WG1094985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	534		66.0	200	1	04/16/2018 21:33	WG1094913
Residual Range Organics (RRO)	266		82.5	250	1	04/16/2018 21:33	WG1094913
(S) o-Terphenyl	*97.5*			*52.0-156*		*04/16/2018 21:33*	WG1094913

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	04/09/2018 04:02	WG1095399
Benzo(a)pyrene	U		0.0116	0.0500	1	04/09/2018 04:02	WG1095399
Benzo(b)fluoranthene	U		0.00212	0.0500	1	04/09/2018 04:02	WG1095399
Benzo(k)fluoranthene	U		0.0136	0.0500	1	04/09/2018 04:02	WG1095399
Chrysene	U		0.0108	0.0500	1	04/09/2018 04:02	WG1095399
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	04/09/2018 04:02	WG1095399
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	04/09/2018 04:02	WG1095399
(S) Nitrobenzene-d5	*151*			*31.0-160*		*04/09/2018 04:02*	WG1095399
(S) 2-Fluorobiphenyl	*104*			*48.0-148*		*04/09/2018 04:02*	WG1095399
(S) p-Terphenyl-d14	*97.2*			*37.0-146*		*04/09/2018 04:02*	WG1095399

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	04/07/2018 04:26	WG1094985
Naphthalene	0.558	J	0.174	2.50	1	04/07/2018 04:26	WG1094985
(S) Toluene-d8	*97.5*			*80.0-120*		*04/07/2018 04:26*	WG1094985
(S) Dibromofluoromethane	*110*			*76.0-123*		*04/07/2018 04:26*	WG1094985
(S) 4-Bromofluorobenzene	*92.7*			*80.0-120*		*04/07/2018 04:26*	WG1094985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	776		66.0	200	1	04/14/2018 01:18	WG1094913
Residual Range Organics (RRO)	550		82.5	250	1	04/14/2018 01:18	WG1094913
(S) o-Terphenyl	*115*			*52.0-156*		*04/14/2018 01:18*	WG1094913

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	04/09/2018 04:26	WG1095399
Benzo(a)pyrene	U		0.0116	0.0500	1	04/09/2018 04:26	WG1095399
Benzo(b)fluoranthene	U		0.00212	0.0500	1	04/09/2018 04:26	WG1095399
Benzo(k)fluoranthene	U		0.0136	0.0500	1	04/09/2018 04:26	WG1095399
Chrysene	U		0.0108	0.0500	1	04/09/2018 04:26	WG1095399
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	04/09/2018 04:26	WG1095399
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	04/09/2018 04:26	WG1095399
(S) Nitrobenzene-d5	*156*			*31.0-160*		*04/09/2018 04:26*	WG1095399
(S) 2-Fluorobiphenyl	*106*			*48.0-148*		*04/09/2018 04:26*	WG1095399
(S) p-Terphenyl-d14	*96.3*			*37.0-146*		*04/09/2018 04:26*	WG1095399

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzene	U		0.0896	0.500	1	04/07/2018 04:48	WG1094985
Naphthalene	3.45		0.174	2.50	1	04/07/2018 04:48	WG1094985
(S) Toluene-d8	*97.5*			*80.0-120*		*04/07/2018 04:48*	WG1094985
(S) Dibromofluoromethane	*109*			*76.0-123*		*04/07/2018 04:48*	WG1094985
(S) 4-Bromofluorobenzene	*89.8*			*80.0-120*		*04/07/2018 04:48*	WG1094985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	218		66.0	200	1	04/14/2018 01:34	WG1094913
Residual Range Organics (RRO)	374		82.5	250	1	04/14/2018 01:34	WG1094913
(S) o-Terphenyl	*114*			*52.0-156*		*04/14/2018 01:34*	WG1094913

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	U		0.00410	0.0500	1	04/09/2018 04:50	WG1095399
Benzo(a)pyrene	U		0.0116	0.0500	1	04/09/2018 04:50	WG1095399
Benzo(b)fluoranthene	U		0.00212	0.0500	1	04/09/2018 04:50	WG1095399
Benzo(k)fluoranthene	U		0.0136	0.0500	1	04/09/2018 04:50	WG1095399
Chrysene	U		0.0108	0.0500	1	04/09/2018 04:50	WG1095399
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	04/09/2018 04:50	WG1095399
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	04/09/2018 04:50	WG1095399
(S) Nitrobenzene-d5	*153*			*31.0-160*		*04/09/2018 04:50*	WG1095399
(S) 2-Fluorobiphenyl	*106*			*48.0-148*		*04/09/2018 04:50*	WG1095399
(S) p-Terphenyl-d14	*86.8*			*37.0-146*		*04/09/2018 04:50*	WG1095399

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Benzene	U		0.0896	0.500	1	04/07/2018 05:09	WG1094985
Naphthalene	0.250	J	0.174	2.50	1	04/07/2018 05:09	WG1094985
(S) Toluene-d8	*95.3*			*80.0-120*		*04/07/2018 05:09*	WG1094985
(S) Dibromofluoromethane	*112*			*76.0-123*		*04/07/2018 05:09*	WG1094985
(S) 4-Bromofluorobenzene	*90.0*			*80.0-120*		*04/07/2018 05:09*	WG1094985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Diesel Range Organics (DRO)	316		66.0	200	1	04/14/2018 01:50	WG1094913
Residual Range Organics (RRO)	362		82.5	250	1	04/14/2018 01:50	WG1094913
(S) o-Terphenyl	*116*			*52.0-156*		*04/14/2018 01:50*	WG1094913

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	ug/l		ug/l	ug/l		date / time	
Benzo(a)anthracene	U		0.00410	0.0500	1	04/09/2018 05:13	WG1095399
Benzo(a)pyrene	U		0.0116	0.0500	1	04/09/2018 05:13	WG1095399
Benzo(b)fluoranthene	U		0.00212	0.0500	1	04/09/2018 05:13	WG1095399
Benzo(k)fluoranthene	U		0.0136	0.0500	1	04/09/2018 05:13	WG1095399
Chrysene	U		0.0108	0.0500	1	04/09/2018 05:13	WG1095399
Dibenz(a,h)anthracene	U		0.00396	0.0500	1	04/09/2018 05:13	WG1095399
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500	1	04/09/2018 05:13	WG1095399
(S) Nitrobenzene-d5	*157*			*31.0-160*		*04/09/2018 05:13*	WG1095399
(S) 2-Fluorobiphenyl	*105*			*48.0-148*		*04/09/2018 05:13*	WG1095399
(S) p-Terphenyl-d14	*94.3*			*37.0-146*		*04/09/2018 05:13*	WG1095399

Method Blank (MB)

(MB) R3300618-3 04/06/18 22:39

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzene	U		0.0896	0.500
Naphthalene	U		0.174	2.50
(S) Toluene-d8	*95.6*			*80.0-120*
(S) Dibromofluoromethane	*109*			*76.0-123*
(S) 4-Bromofluorobenzene	*93.2*			*80.0-120*

Laboratory Control Sample (LCS)

(LCS) R3300618-1 04/06/18 21:35

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	25.0	27.7	111	69.0-123	
Naphthalene	25.0	26.9	108	62.0-128	
(S) Toluene-d8			*95.7*	*80.0-120*	
(S) Dibromofluoromethane			*110*	*76.0-123*	
(S) 4-Bromofluorobenzene			*85.9*	*80.0-120*	

Method Blank (MB)

(MB) R3300869-1 04/07/18 17:59

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Diesel Range Organics (DRO)	U		66.7	200
Residual Range Organics (RRO)	U		83.3	250
(S) o-Terphenyl	*109*			*52.0-156*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3300869-2 04/07/18 18:16 • (LCSD) R3300869-3 04/07/18 18:32

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	750	770	759	103	101	50.0-150			1.38	20
Residual Range Organics (RRO)	750	894	798	119	106	50.0-150			11.3	20
(S) o-Terphenyl				*119*	*99.0*	*52.0-156*				

Method Blank (MB)

(MB) R3300582-3 04/09/18 03:39

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Benzo(a)anthracene	U		0.00410	0.0500
Benzo(a)pyrene	U		0.0116	0.0500
Benzo(b)fluoranthene	U		0.00212	0.0500
Benzo(k)fluoranthene	U		0.0136	0.0500
Chrysene	U		0.0108	0.0500
Dibenz(a,h)anthracene	U		0.00396	0.0500
Indeno(1,2,3-cd)pyrene	U		0.0148	0.0500
(S) Nitrobenzene-d5	*160*			*31.0-160*
(S) 2-Fluorobiphenyl	*111*			*48.0-148*
(S) p-Terphenyl-d14	*98.7*			*37.0-146*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3300582-1 04/09/18 02:52 • (LCSD) R3300582-2 04/09/18 03:15

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	2.00	1.92	1.96	96.2	98.2	59.0-134			2.03	20
Benzo(a)pyrene	2.00	2.13	2.14	107	107	61.0-145			0.463	20
Benzo(b)fluoranthene	2.00	2.03	2.12	101	106	57.0-136			4.26	20
Benzo(k)fluoranthene	2.00	2.12	1.98	106	99.0	57.0-141			6.83	20
Chrysene	2.00	2.21	2.26	110	113	63.0-140			2.17	20
Dibenz(a,h)anthracene	2.00	2.33	2.25	116	113	49.0-141			3.22	20
Indeno(1,2,3-cd)pyrene	2.00	2.34	2.31	117	115	53.0-141			1.26	20
(S) Nitrobenzene-d5				*157*	*158*	*31.0-160*				
(S) 2-Fluorobiphenyl				*111*	*108*	*48.0-148*				
(S) p-Terphenyl-d14				*94.8*	*93.4*	*37.0-146*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia[1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky[1,6]	90010
Kentucky[2]	16
Louisiana	AI30792
Louisiana[1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico[1]	n/a
New York	11742
North Carolina	Env375
North Carolina[1]	DW21704
North Carolina[3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee[1,4]	2006
Texas	T 104704245-17-14
Texas[5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

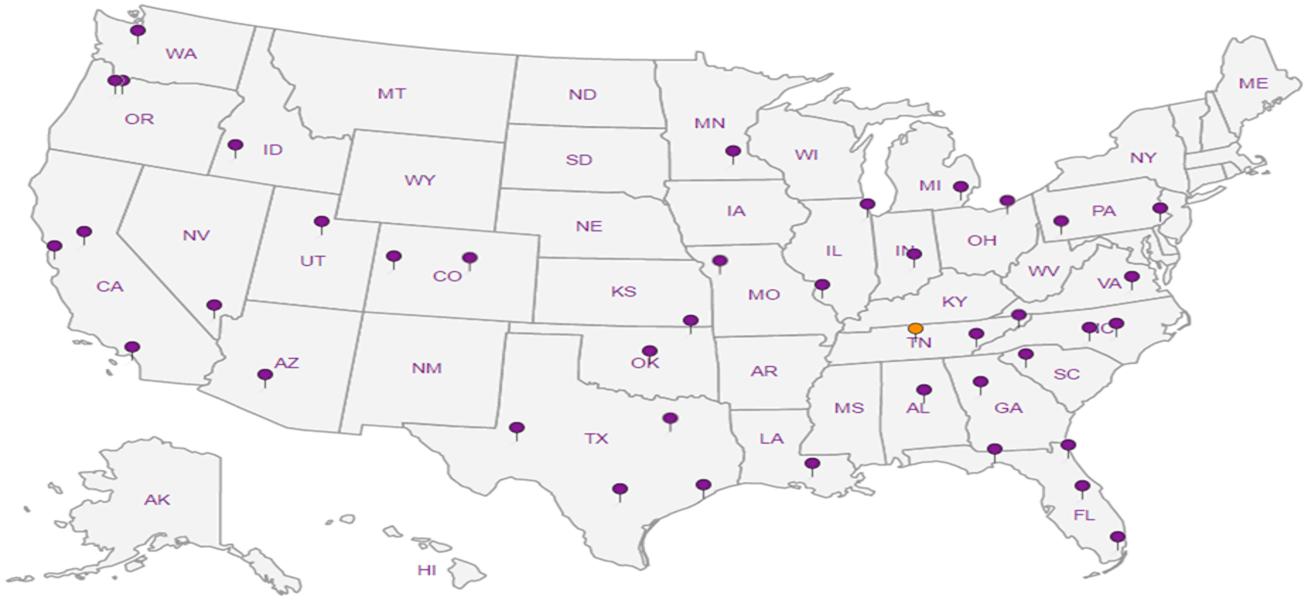
A2LA – ISO 17025	1461.01
A2LA – ISO 17025[5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:
Accounts Payable
1800 Blankenship Rd, Ste 440
West Linn, OR 97068

Pres Chk

Chain of Custody Page 1 of 1

ESC
L·A·B S·C·I·E·N·C·E·S
a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.00048**

Lab Project # **SLRWLOR-NORDDOOR**

L# L983742

D023

Acctnum: **SLRWLOR**
Template: **T134417**
Prelogin: **P645927**
TSR: **110 - Brian Ford**
PB: JB 3-29-18
Shipped Via: **FedEX Ground**

Collected by (print): RFK & SL

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	NWTPHDX LVINOSGT 40mlAmb-HCl-BT	PAHSIMLVID cPAHs 40mlAmb-NoPres-WT	V8260LLC Benz/naph 40mlAmb-HCl	Remarks	Sample # (lab only)
NTD-SW-East-0418	G	GW	–	4/5/18	755	7	X	X	X		-01
NTD-SW-West-0418	G	GW	–	4/5/18	830	7	+	X	X		02
NTD-SW-3"-0418	G	GW	–	4/4/18	1050	7	X	X	X		03
NTD-SW-8"-0418	G	GW	–	4/4/18	1115	7	X	X	X		04
		GW									
		GW									
		GW									
		GW									
		GW									
		GW									

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking # 4269 9218 7398

Sample Receipt Checklist
COC Seal Present/Intact: __NP [✓ Y] __N
COC Signed/Accurate: [✓ Y] __N
Bottles arrive intact: [✓ Y] __N
Correct bottles used: [✓ Y] __N
Sufficient volume sent: [✓ Y] __N
If Applicable
VOA Zero Headspace: [✓ Y] __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date: 4/5/18	Time: 230 PM	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) 861

Trip Blank Received: [✓ Yes] / No
1 [✓ HCl] / MeoH
TBR

Temp: 1.2 °C
Bottles Received: 28

Date: 4/6/18 Time: 8:45

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

NTD Sump Solids Sampling

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value “H” is assigned. If the obtained value is less than half the specified value “h” is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. ‘Xx’ denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the “D” indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the “S” indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

Sample ID: NTD-Sed-0418 Method 8290A

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B2137	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	12.44 g	Lab Sample ID	B2137_15734_DF_001	Date Extracted:	11-Apr-2018
Date Collected:	04-Apr-2018	% Solid:	52.3 %	QC Batch No:	15734	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	6:27:27

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	2.44				ES 2378-TCDD	80.5	
12378-PeCDD	15.2				ES 12378-PeCDD	72.2	
123478-HxCDD	34.3				ES 123478-HxCDD	62.5	
123678-HxCDD	100				ES 123678-HxCDD	65	
123789-HxCDD	66.5				ES 123789-HxCDD	59.6	
1234678-HpCDD	2,620				ES 1234678-HpCDD	51	
OCDD	23,700			E	ES OCDD	27.5	
2378-TCDF	4.45				ES 2378-TCDF	77.6	
12378-PeCDF	5.14				ES 12378-PeCDF	69.8	
23478-PeCDF	11.6				ES 23478-PeCDF	63.6	
123478-HxCDF	24.5				ES 123478-HxCDF	63	
123678-HxCDF	23.3				ES 123678-HxCDF	61	
234678-HxCDF	34.1				ES 234678-HxCDF	52.2	
123789-HxCDF	ND	0.566			ES 123789-HxCDF	59	
1234678-HpCDF	554				ES 1234678-HpCDF	49.2	
1234789-HpCDF	30.8				ES 1234789-HpCDF	48.3	
OCDF	1,210				ES OCDF	31	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	87.2	
Total TCDD	25.4		25.7		CS 12347-PeCDD	78.6	
Total PeCDD	85.8		85.8		CS 12346-PeCDF	81.1	
Total HxCDD	682		682		CS 123469-HxCDF	71.2	
Total HpCDD	4,570		4,570		CS 1234689-HpCDF	59.8	
Total TCDF	61.4		63.3				
Total PeCDF	214		214				
Total HxCDF	712		719				
Total HpCDF	1,520		1,520				
Total PCDD/Fs	**32,800**		**32,800**				
ITEF TEQs							
TEQ: ND=0	102		102				
TEQ: ND=DL/2	102	0.575	102				
TEQ: ND=DL	102	1.15	102				

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

Sample ID: Method Blank B2137_15734 Method 8290A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B2137	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	10.00 g	Lab Sample ID	MB1_15734_DF_SDS	Date Extracted:	11-Apr-2018
Date Collected:	n/a	% Solid:	n/a	QC Batch No:	15734	Date Analyzed:	04-May-2018
		Split:	-	Dilution:	-	Time Analyzed:	4:51:53

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.239			ES 2378-TCDD	83	
12378-PeCDD	ND	0.118			ES 12378-PeCDD	86.4	
123478-HxCDD	ND	0.127			ES 123478-HxCDD	82.4	
123678-HxCDD	ND	0.137			ES 123678-HxCDD	82.1	
123789-HxCDD	ND	0.13			ES 123789-HxCDD	84.4	
1234678-HpCDD	ND	0.119			ES 1234678-HpCDD	83.2	
OCDD	2.26			J	ES OCDD	62.3	
2378-TCDF	ND	0.141			ES 2378-TCDF	86	
12378-PeCDF	ND	0.107			ES 12378-PeCDF	89.8	
23478-PeCDF	ND	0.111			ES 23478-PeCDF	84.3	
123478-HxCDF	ND	0.0812			ES 123478-HxCDF	76.8	
123678-HxCDF	ND	0.0799			ES 123678-HxCDF	76.4	
234678-HxCDF	ND	0.0834			ES 234678-HxCDF	76.2	
123789-HxCDF	ND	0.0929			ES 123789-HxCDF	78.9	
1234678-HpCDF	ND	0.118			ES 1234678-HpCDF	80.9	
1234789-HpCDF	ND	0.12			ES 1234789-HpCDF	77.9	
OCDF	ND	0.167			ES OCDF	67.6	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	93.1	
Total TCDD	ND	0.239	ND		CS 12347-PeCDD	95.8	
Total PeCDD	ND	0.118	ND		CS 12346-PeCDF	94	
Total HxCDD	ND	0.131	ND		CS 123469-HxCDF	87.6	
Total HpCDD	ND	0.119	ND		CS 1234689-HpCDF	86.7	
Total TCDF	ND	0.141	ND				
Total PeCDF	ND	0.109	ND				
Total HxCDF	ND	0.084	ND				
Total HpCDF	ND	0.119	ND				
Total PCDD/Fs	**2.26**		**2.26**				
ITEF TEQs							
TEQ: ND=0	0.00226		0.00226				
TEQ: ND=DL/2	0.227	0.225	0.227				
TEQ: ND=DL	0.452	0.45	0.452				

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METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_09062018_09OCT2017		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	180504R02	Analysis Date:	04-MAY-2018 02:28:30
Lab ID:	OPR1_15734_DF		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	9.96	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	47	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	52.4	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	51.8	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	48.9	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	52.5	35	-	70	Y
OCDD	100	113	78	-	144	Y
2,3,7,8-TCDF	10	9.93	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	52.5	40	-	67	Y
2,3,4,7,8-PeCDF	50	52.3	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	51.7	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	50.1	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	53.7	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	52.1	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	57.3	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	56.1	39	-	69	Y
OCDF	100	107	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 04 May 2018 11:43 Analyst: pw

METHOD 8290A **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM3_DF_09062018_09OCT2017		
Instrument ID:	MM3	GC Column ID:	ZB-5ms
VER Data Filename:	180504R02	Analysis Date:	04-MAY-2018 02:28:30
Lab ID:	OPR1_15734_DF		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	72.9	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	85.8	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	76.4	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	77.9	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	81.8	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	83.1	26	-	166	Y
13C-OCDD	200	103	26	-	397	Y
13C-2,3,7,8-TCDF	100	76.3	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	80.4	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	79.9	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	69.1	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	70.8	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	71	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	72.8	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	76	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	73.4	20	-	186	Y
13C-OCDF	200	109	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	32.5	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 04 May 2018 11:43 Analyst: pw

Sample ID: NTD-Sed-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B2137	Date Received:	06-Apr-2018
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	12.44 g	Sample ID:	B2137_15734_PCB_001	Date Extracted:	11-Apr-2018
Date Collected:	04-Apr-2018	% Solid	52.3 %	QC Batch No.:	15734	Date Analyzed:	04-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	211				ES PCB-1	21.6
PCB-81 344'5-TeCB	40.8				ES PCB-3	47.4
PCB-105 233'44'-PeCB	551				ES PCB-4	54.6
PCB-114 2344'5-PeCB	70.1				ES PCB-15	151 V
PCB-118 23'44'5-PeCB	1,240				ES PCB-19	111
PCB-123 23'44'5'-PeCB	60.4				ES PCB-37	81.4
PCB-126 33'44'5-PeCB	46				ES PCB-54	62.9
PCB-156/157 233'44'5/233'44'5'-HxCB	249			C	ES PCB-77	70.2
PCB-167 23'44'55'-HxCB	89.9				ES PCB-81	78.5
PCB-169 33'44'55'-HxCB	50.3				ES PCB-104	122
PCB-189 233'44'55'-HpCB	EMPC		47.8		ES PCB-105	63.8
					ES PCB-114	61.8
TEQs (WHO 2005 M/H)					ES PCB-118	71.8
					ES PCB-123	77.2
ND = 0	6.21		6.21		ES PCB-126	48.8
ND = 0.5 x DL	6.21		6.21		ES PCB-153	112
ND = DL	6.21		6.21		ES PCB-155	153 V
					ES PCB-156/157	58.4
Totals					ES PCB-167	70.3
Mono-CB	111				ES PCB-169	47.1
Di-CB	1,370				ES PCB-170	109
Tri-CB	8,590				ES PCB-180	113
Tetra-CB	15,100				ES PCB-188	139
Penta-CB	12,900		12,900		ES PCB-189	89.1
Hexa-CB	7,330				ES PCB-202	92.8
Hepta-CB	3,420		3,540		ES PCB-205	91.1
Octa-CB	1,060				ES PCB-206	103
Nona-CB	351				ES PCB-208	103
Deca-CB	166				ES PCB-209	124
					CS PCB-28	50.9
Total PCB (Mono-Deca)	50,400		50,600		CS PCB-111	62.9
					CS PCB-178	82.8

Checkcode: 919-213-BDQ/A SGS North America - PCB v0.82 Report Created: 05-May-2018 15:02 Analyst: MS

Sample ID: NTD-Sed-0418

Method 1668A

Client Data		**Sample Data**		**Laboratory Data**	
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B2137
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	12.44 g	Sample ID:	B2137_15734_PCB_001
Date Collected:	04-Apr-2018	% Solid	52.3 %	QC Batch No.:	15734
		Units	pg/g	Checkcode:	919-213-BDQ/A

Date Received:	06-Apr-2018
Date Extracted:	11-Apr-2018
Date Analyzed:	04-May-2018
Time Analyzed:	13:33:45

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	37.7		PCB-19	109		PCB-54	51.9		PCB-72	55.9	
PCB-2	29.6		PCB-30/18	1,350	C	PCB-50/53	322	C	PCB-68	52.2	
PCB-3	43.8		PCB-17	741		PCB-45	192		PCB-57	44.6	
			PCB-27	138		PCB-51	299		PCB-58	43.1	
Conc.	111		PCB-24	57.8		PCB-46	139		PCB-67	92.3	
EMPC	111		PCB-16	670		PCB-52	2,050		PCB-63	94	
			PCB-32	511		PCB-73	62.4		PCB-61/70/74/76	2,640	C
Di	**Conc.**	**Qualifiers**	PCB-34	35		PCB-43	99.1		PCB-66	1,440	
PCB-4	116		PCB-23	25.6		PCB-69/49	1,220	C	PCB-55	56.1	
PCB-10	23.5		PCB-26/29	321	C	PCB-48	401		PCB-56	719	
PCB-9	25.6		PCB-25	213		PCB-44/47/65	1,940	C	PCB-60	285	
PCB-7	21.4		PCB-31	1,230		PCB-59/62/75	240	C	PCB-80	37.6	
PCB-6	83.5		PCB-28/20	1,440	C	PCB-42	534		PCB-79	50.4	
PCB-5	19.2		PCB-21/33	654	C	PCB-41	114		PCB-78	33.9	
PCB-8	247		PCB-22	495		PCB-71/40	877	C	PCB-81	40.8	
PCB-14	24.1		PCB-36	31.6		PCB-64	668		PCB-77	211	
PCB-11	347		PCB-39	42.1							
PCB-13/12	117	C	PCB-38	30.8							
PCB-15	347		PCB-35	82.6							
			PCB-37	412							
Conc.	1,370		**Conc.**	8,590					**Conc.**	15,100	
EMPC	1,370		**EMPC**	8,590					**EMPC**	15,100	

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Totals	Conc.	EMPC
Mono-Tri	10,100	10,100
Tetra-Hexa	35,300	35,400
Hepta-Deca	5,000	5,110
Mono-Deca	50,400	50,600

Sample ID: NTD-Sed-0418 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	40.5		PCB-108/119/86/97/125/87	1,310	C	PCB-155	51.9		PCB-165	35.9	
PCB-96	48.2		PCB-117	84.5		PCB-152	33.6		PCB-146	221	
PCB-103	86.1		PCB-116/85	312	C	PCB-150	41.9		PCB-161	31.6	
PCB-94	74.7		PCB-110	1,860		PCB-136	197		PCB-153/168	974	C
PCB-95	1,580		PCB-115	(9.14)		PCB-145	33.5		PCB-141	245	
PCB-100/93	184	C	PCB-82	234		PCB-148	51.3		PCB-130	107	
PCB-102	167		PCB-111	39		PCB-151/135	609	C	PCB-137	65.4	
PCB-98	(13.8)		PCB-120	41.2		PCB-154	82.6		PCB-164	115	
PCB-88	423		PCB-107/124	118	C	PCB-144	116		PCB-163/138/129	1,180	C
PCB-91	(11.7)		PCB-109	113		PCB-147/149	1,280	C	PCB-160	31.8	
PCB-84	632		PCB-123	60.4		PCB-134	121		PCB-158	132	
PCB-89	76.3		PCB-106	31		PCB-143	53.7		PCB-128/166	294	C
PCB-121	48.4		PCB-118	1,240		PCB-139/140	110	C	PCB-159	52.3	
PCB-92	428		PCB-122	54		PCB-131	92.3		PCB-162	42.9	
PCB-113/90/101	1,860	C	PCB-114	70.1		PCB-142	(0.653)		PCB-167	89.9	
PCB-83	151		PCB-105	551		PCB-132	485		PCB-156/157	249	C
PCB-99	891		PCB-127	41.3		PCB-133	55.2		PCB-169	50.3	
PCB-112	[35.2]	EMPC	PCB-126	46							
			Conc.	12,900					**Conc.**	7,330	
			EMPC	12,900					**EMPC**	7,330	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	34.1		PCB-174	439		PCB-202	83		PCB-208	96.7	
PCB-179	155		PCB-177	248		PCB-201	60.6		PCB-207	47.3	
PCB-184	30.7		PCB-181	42.7		PCB-204	35		PCB-206	207	
PCB-176	64.8		PCB-171/173	185	C	PCB-197	42				
PCB-186	29.8		PCB-172	90		PCB-200	51		**Conc.**	351	
PCB-178	76.5		PCB-192	35.2		PCB-198/199	213	C	**EMPC**	351	
PCB-175	64.5		PCB-180/193	688	C	PCB-196	86.4				
PCB-187	548		PCB-191	46.9		PCB-203	117		**Deca**	**Conc.**	**Qualifiers**
PCB-182	47.7		PCB-170	277		PCB-195	107		PCB-209	166	
PCB-183	251		PCB-190	68.8		PCB-194	217				
PCB-185	[65.6]	EMPC	PCB-189	[47.8]	EMPC	PCB-205	47.4				
			Conc.	3,420		**Conc.**	1,060				
			EMPC	3,540		**EMPC**	1,060				

Sample ID: Method Blank B2137_15734 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B2137	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	10.00 g	Sample ID:	MB1_15734_PCB_SDS	Date Extracted:	11-Apr-2018
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	15734	Date Analyzed:	04-May-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.532			ES PCB-1	38.1
PCB-81 344'5-TeCB	ND	0.494			ES PCB-3	42.7
PCB-105 233'44'-PeCB	1.06				ES PCB-4	47.6
PCB-114 2344'5-PeCB	ND	0.335			ES PCB-15	64.1
PCB-118 23'44'5-PeCB	2.44				ES PCB-19	54.4
PCB-123 23'44'5'-PeCB	ND	0.325			ES PCB-37	85.4
PCB-126 33'44'5-PeCB	ND	0.388			ES PCB-54	67.6
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	0.531		C	ES PCB-77	92.8
PCB-167 23'44'55'-HxCB	ND	0.346			ES PCB-81	96.3
PCB-169 33'44'55'-HxCB	ND	0.449			ES PCB-104	78.9
PCB-189 233'44'55'-HpCB	ND	0.295			ES PCB-105	96
					ES PCB-114	76.9
TEQs (WHO 2005 M/H)					ES PCB-118	86.4
					ES PCB-123	92.7
ND = 0	0.000105		0.000105		ES PCB-126	90.3
ND = 0.5 x DL	0.0264		0.0264		ES PCB-153	85.6
ND = DL	0.0526		0.0526		ES PCB-155	68.2
					ES PCB-156/157	77.2
Totals					ES PCB-167	79
Mono-CB	ND	0.589			ES PCB-169	67.9
Di-CB	9.26				ES PCB-170	93.3
Tri-CB	10.9		17.5		ES PCB-180	90.9
Tetra-CB	38.7		42.2		ES PCB-188	91.6
Penta-CB	14.8		16.3		ES PCB-189	88.8
Hexa-CB	ND	0.404			ES PCB-202	101
Hepta-CB			0.401		ES PCB-205	95
Octa-CB	ND	0.351			ES PCB-206	94.8
Nona-CB	ND	0.811			ES PCB-208	101
Deca-CB	ND	0.842			ES PCB-209	116
					CS PCB-28	80.6
Total PCB (Mono-Deca)	73.7		85.6		CS PCB-111	114
					CS PCB-178	124

Checkcode: 759-922-NWC/A SGS North America - PCB v0.82 Report Created: 05-May-2018 15:02 Analyst: MS

Sample ID: Method Blank B2137_15734 Method 1668A

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Project No.:	B2137	Date Received:	n/a
Project ID:	Former E.A. Nord Door Site	Weight/Volume:	10.00 g	Sample ID:	MB1_15734_PCB_SDS	Date Extracted:	11-Apr-2018
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	15734	Date Analyzed:	04-May-2018
		Units	pg/g	Checkcode:	759-922-NWC/A	Time Analyzed:	12:34:19

Mono	**Conc.**	**Qualifiers**	**Tri**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**	**Tetra**	**Conc.**	**Qualifiers**
PCB-1	(0.584)		PCB-19	(2.94)		PCB-54	(0.61)		PCB-72	(0.446)	
PCB-2	(0.582)		PCB-30/18	[3.42]	EMPC C	PCB-50/53	0.953	J C	PCB-68	(0.408)	
PCB-3	(0.595)		PCB-17	(2.66)		PCB-45	[0.731]	J EMPC	PCB-57	(0.47)	
			PCB-27	(1.86)		PCB-51	(0.506)		PCB-58	(0.447)	
Conc.	0		PCB-24	(2.03)		PCB-46	(0.668)		PCB-67	(0.426)	
EMPC	0		PCB-16	(3.25)		PCB-52	8.13		PCB-63	(0.421)	
			PCB-32	4.11		PCB-73	(0.437)		PCB-61/70/74/76	5.32	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.867)		PCB-43	(0.62)		PCB-66	5.09	
PCB-4	(1.62)		PCB-23	(0.846)		PCB-69/49	5.07	C	PCB-55	(0.483)	
PCB-10	(1.09)		PCB-26/29	(0.835)	C	PCB-48	[0.634]	J EMPC	PCB-56	[1.37]	EMPC
PCB-9	(1.73)		PCB-25	(0.811)		PCB-44/47/65	6.86	C	PCB-60	1.09	
PCB-7	(1.58)		PCB-31	[3.1]	EMPC	PCB-59/62/75	[0.725]	J EMPC C	PCB-80	(0.403)	
PCB-6	(1.7)		PCB-28/20	5.4	C	PCB-42	1.49		PCB-79	(0.365)	
PCB-5	(1.66)		PCB-21/33	(0.801)	C	PCB-41	(0.699)		PCB-78	(0.476)	
PCB-8	2.66		PCB-22	1.44		PCB-71/40	1.49	J C	PCB-81	(0.494)	
PCB-14	(1.41)		PCB-36	(0.794)		PCB-64	3.21		PCB-77	(0.532)	
PCB-11	5.34		PCB-39	(0.767)							
PCB-13/12	(1.55)	C	PCB-38	(0.797)							
PCB-15	1.26		PCB-35	(0.89)							
			PCB-37	(0.857)							
Conc.	9.26		**Conc.**	10.9					**Conc.**	38.7	
EMPC	9.26		**EMPC**	17.5					**EMPC**	42.2	

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Totals	**Conc.**	**EMPC**
Mono-Tri	20.2	26.7
Tetra-Hexa	53.5	58.4
Hepta-Deca	0	0.401
Mono-Deca	73.7	85.6

Sample ID: Method Blank B2137_15734 Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.305)		PCB-108/119/86/97/125/87	1.97	J C	PCB-155	(0.289)		PCB-165	(0.275)	
PCB-96	(0.336)		PCB-117	(0.317)		PCB-152	(0.277)		PCB-146	(0.306)	
PCB-103	(0.4)		PCB-116/85	[0.862]	J EMPC C	PCB-150	(0.299)		PCB-161	(0.249)	
PCB-94	(0.46)		PCB-110	2.93		PCB-136	(0.311)		PCB-153/168	(0.256)	C
PCB-95	2.01		PCB-115	(0.3)		PCB-145	(0.316)		PCB-141	(0.337)	
PCB-100/93	(0.403)	C	PCB-82	(0.508)		PCB-148	(0.342)		PCB-130	(0.381)	
PCB-102	(0.392)		PCB-111	(0.282)		PCB-151/135	(0.353)	C	PCB-137	(0.312)	
PCB-98	(0.453)		PCB-120	(0.287)		PCB-154	(0.301)		PCB-164	(0.249)	
PCB-88	(0.447)		PCB-107/124	(0.317)	C	PCB-144	(0.346)		PCB-163/138/129	(0.305)	C
PCB-91	(0.384)		PCB-109	(0.287)		PCB-147/149	(0.339)	C	PCB-160	(0.258)	
PCB-84	[0.588]	J EMPC	PCB-123	(0.325)		PCB-134	(0.434)		PCB-158	(0.228)	
PCB-89	(0.484)		PCB-106	(0.312)		PCB-143	(0.349)		PCB-128/166	(0.368)	C
PCB-121	(0.314)		PCB-118	2.44		PCB-139/140	(0.33)	C	PCB-159	(0.306)	
PCB-92	(0.455)		PCB-122	(0.362)		PCB-131	(0.374)		PCB-162	(0.317)	
PCB-113/90/101	2.55	J C	PCB-114	(0.335)		PCB-142	(0.377)		PCB-167	(0.346)	
PCB-83	(0.553)		PCB-105	1.06		PCB-132	(0.368)		PCB-156/157	(0.531)	C
PCB-99	1.86		PCB-127	(0.298)		PCB-133	(0.32)		PCB-169	(0.449)	
PCB-112	(0.32)		PCB-126	(0.388)							
			Conc.	14.8					**Conc.**	0	
			EMPC	16.3					**EMPC**	0	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.209)		PCB-174	(0.423)		PCB-202	(0.255)		PCB-208	(0.483)	
PCB-179	(0.226)		PCB-177	(0.418)		PCB-201	(0.254)		PCB-207	(0.431)	
PCB-184	(0.23)		PCB-181	(0.373)		PCB-204	(0.269)		PCB-206	(1.14)	
PCB-176	(0.208)		PCB-171/173	(0.425)	C	PCB-197	(0.254)				
PCB-186	(0.221)		PCB-172	(0.409)		PCB-200	(0.254)		**Conc.**	0	
PCB-178	(0.288)		PCB-192	(0.316)		PCB-198/199	(0.335)	C	**EMPC**	0	
PCB-175	(0.391)		PCB-180/193	[0.401]	J EMPC C	PCB-196	(0.331)				
PCB-187	(0.357)		PCB-191	(0.296)		PCB-203	(0.325)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.347)		PCB-170	(0.427)		PCB-195	(0.538)		PCB-209	(0.842)	
PCB-183	(0.349)		PCB-190	(0.287)		PCB-194	(0.513)				
PCB-185	(0.368)		PCB-189	(0.295)		PCB-205	(0.447)				
			Conc.	0		**Conc.**	0				
			EMPC	0.401		**EMPC**	0				

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM7_PCB_06072017_03MAR2018		
Instrument ID:	MM7	GC Column ID:	
VER Data Filename:	180503X11	Analysis Date:	04-MAY-2018 11:34:54
Lab ID:	OPR1_15734_PCB		

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	116	50	-	150	Y
PCB-3 4-MoCB	50	108	50	-	150	Y
PCB-4 22'-DiCB	50	96.7	50	-	150	Y
PCB-15 44'-DiCB	50	118	50	-	150	Y
PCB-19 22'6-TrCB	50	104	50	-	150	Y
PCB-37 344'-TrCB	50	104	50	-	150	Y
PCB-54 22'66'-TeCB	50	91	50	-	150	Y
PCB-77 33'44'-TeCB	50	116	50	-	150	Y
PCB-81 344'5-TeCB	50	118	50	-	150	Y
PCB-104 22'466'-PeCB	50	100	50	-	150	Y
PCB-105 233'44'-PeCB	50	113	50	-	150	Y
PCB-114 2344'5-PeCB	50	113	50	-	150	Y
PCB-118 23'44'5-PeCB	50	109	50	-	150	Y
PCB-123 23'44'5'-PeCB	50	110	50	-	150	Y
PCB-126 33'44'5-PeCB	50	125	50	-	150	Y
PCB-155 22'44'66'-HxCB	50	105	50	-	150	Y
PCB-156/157 ...-HxCB	100	111	50	-	150	Y
PCB-167 23'44'55'-HxCB	50	125	50	-	150	Y
PCB-169 33'44'55'-HxCB	50	122	50	-	150	Y
PCB-188 22'34'566'-HpCB	50	95.8	50	-	150	Y
PCB-189 233'44'55'-HpCB	50	123	50	-	150	Y
PCB-202 22'33'55'66'-OcCB	50	94.4	50	-	150	Y
PCB-205 233'44'55'6-OcCB	50	108	50	-	150	Y
PCB-206 22'33'44'55'6-NoCB	50	106	50	-	150	Y
PCB-208 22'33'455'66'-NoCB	50	114	50	-	150	Y
PCB-209 DeCB	50	108	50	-	150	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668A.

Processed: 05 May 2018 15:02 Analyst: MS

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: MM7_PCB_06072017_03MAR2018		
Instrument ID:	MM7	GC Column ID:	
VER Data Filename:	180503X11	Analysis Date:	04-MAY-2018 11:34:54
Lab ID:	OPR1_15734_PCB		

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)	OK
ES PCB-1	100	20.8	15 - 140	Y
ES PCB-3	100	31.9	15 - 140	Y
ES PCB-4	100	38.9	30 - 140	Y
ES PCB-15	100	60.7	30 - 140	Y
ES PCB-19	100	52.4	30 - 140	Y
ES PCB-37	100	61.7	30 - 140	Y
ES PCB-54	100	51.8	30 - 140	Y
ES PCB-77	100	67.8	30 - 140	Y
ES PCB-81	100	67	30 - 140	Y
ES PCB-104	100	65.2	30 - 140	Y
ES PCB-105	100	68.1	30 - 140	Y
ES PCB-114	100	62.3	30 - 140	Y
ES PCB-118	100	69	30 - 140	Y
ES PCB-123	100	71.8	30 - 140	Y
ES PCB-126	100	62.3	30 - 140	Y
ES PCB-153	100	68.8	30 - 140	Y
ES PCB-155	100	61.1	30 - 140	Y
ES PCB-156/157	200	54.2	30 - 140	Y
ES PCB-167	100	54.6	30 - 140	Y
ES PCB-169	100	43.8	30 - 140	Y
ES PCB-170	100	79.4	30 - 140	Y
ES PCB-180	100	82	30 - 140	Y
ES PCB-188	100	83.8	30 - 140	Y
ES PCB-189	100	67.2	30 - 140	Y
ES PCB-202	100	76.5	30 - 140	Y
ES PCB-205	100	73.5	30 - 140	Y
ES PCB-206	100	78.3	30 - 140	Y
ES PCB-208	100	76.7	30 - 140	Y
ES PCB-209	100	93.8	30 - 140	Y
CLEANUP STANDARDS				
CS PCB-28	100	62.5	40 - 125	Y
CS PCB-111	100	82.2	40 - 125	Y
CS PCB-178	100	97.5	40 - 125	Y

Processed: 05 May 2018 15:02 Analyst: MS

SGS

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager: *Amy Boehm*
Receipt Date & Time: *06-Apr-18 at 09:45*
AP Project name: *B2137*
Requested TAT: *21 days*
Projected due date: *27-Apr-18*
Matrix: *Sediment*
Phone#: *910-794-1613*
Email Address: *Amy.Boehm@sgs.com*

Company Contact: *Chris Kramer*
Company: *SLR International Corp*
Project Name & Site: *Former E.A. Nord Door Site*
Project PO#: *108.00228.00098*
QAAP/Contract #: *N/A*
Requested Analysis: *Methods 8290A & 1688A*
Phone#: *503-723-4423*
Email Address: *ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
NTD-Sed-0418	B2137_001	SL	1	4oz Amber	04-Apr-18	13:30	3.3	1	7804 0160 2080

Preservation Type: **Sample Seals:** No

Notes/Comments:

Samples received intact.

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens *Logged in by: Ashley Owens* *QC'ed by:* AK 10 Apr 18

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B2137

SGS CHAIN OF CUSTODY

PROJECT INFO

PROJECT: Forma E.A. Nord Door Site
P.O. #: 108.00228.00018
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS

PRESERVATIVE

ANALYSIS & METHOD

SEND DOCUMENTATION / RESULTS TO

COMPANY: SLR Consulting
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd Ste. 440
West Linn, OR 97068
PHONE: 503-723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO ☒ (CHECK IF SAME)

COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

SAMPLE ID / DESCRIPTION	DATE	TIME	QTY	MATRIX	Dioxins/Furans	PCBs congeners									MS MSD	MS/DUP	REMARKS
NTD-Sed-0418	4/4/18	1330	1	SL	X	X											

	DATE:	TIME:	RECEIVED BY:
COLLECTED/RELINQUISHED BY (1):	4/5/18	230pm	
RELINQUISHED BY (2):			
RELINQUISHED BY (3):			

RECEIVED BY LABORATORY: Ashley Owens DATE: 4/6/18 TIME: 9:45
COOLER SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: FedEx TEMP: °C 3.3°
TRACKING #: 7804 0160 2080

ANALYTICAL REPORT

April 16, 2018

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L983744
Samples Received:	04/06/2018
Project Number:	108.00228.00048
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Technical Service Representative

TABLE OF CONTENTS

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

	Collected by	Collected date/time	Received date/time
NTD-SED-0418 L983744-01 Solid	Steven L.	04/04/18 13:30	04/06/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1095714	1	04/10/18 14:43	04/10/18 14:59	JD
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1095600	1	04/06/18 18:33	04/09/18 13:13	LRL
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1094982	50	04/08/18 16:38	04/09/18 15:01	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1095403	1	04/10/18 08:03	04/11/18 00:47	DMG

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Technical Service Representative

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	55.1		1	04/10/2018 14:59	WG1095714

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000762	J	0.000490	0.00181	1	04/09/2018 13:13	WG1095600
Naphthalene	0.0237		0.0129	0.0227	1	04/09/2018 13:13	WG1095600
(S) Toluene-d8	*102*			*80.0-120*		*04/09/2018 13:13*	WG1095600
(S) Dibromofluoromethane	*81.5*			*74.0-131*		*04/09/2018 13:13*	WG1095600
(S) a,a,a-Trifluorotoluene	*97.8*			*80.0-120*		*04/09/2018 13:13*	WG1095600
(S) 4-Bromofluorobenzene	*97.8*			*64.0-132*		*04/09/2018 13:13*	WG1095600

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	U		120	363	50	04/09/2018 15:01	WG1094982
Residual Range Organics (RRO)	931		299	907	50	04/09/2018 15:01	WG1094982
(S) o-Terphenyl	*80.0*	J7		*18.0-148*		*04/09/2018 15:01*	WG1094982

Sample Narrative:

L983744-01 WG1094982: Dilution due to matrix

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.0567		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Benzo(a)pyrene	0.0516		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Benzo(b)fluoranthene	0.0677		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Benzo(k)fluoranthene	0.0200		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Chrysene	0.108		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Dibenz(a,h)anthracene	0.0133		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
Indeno(1,2,3-cd)pyrene	0.0285		0.00109	0.0109	1	04/11/2018 00:47	WG1095403
(S) Nitrobenzene-d5	*90.3*			*14.0-149*		*04/11/2018 00:47*	WG1095403
(S) 2-Fluorobiphenyl	*84.5*			*34.0-125*		*04/11/2018 00:47*	WG1095403
(S) p-Terphenyl-d14	*74.0*			*23.0-120*		*04/11/2018 00:47*	WG1095403

Method Blank (MB)

(MB) R3300800-1 04/10/18 14:59

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L983740-12 Original Sample (OS) • Duplicate (DUP)

(OS) L983740-12 04/10/18 14:59 • (DUP) R3300800-3 04/10/18 14:59

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	89.0	88.6	1	0.454		5

Laboratory Control Sample (LCS)

(LCS) R3300800-2 04/10/18 14:59

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3300418-3 04/09/18 11:22

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Benzene	U		0.000270	0.00100
Naphthalene	U		0.00710	0.0125
(S) Toluene-d8	*104*			*80.0-120*
(S) Dibromofluoromethane	*81.4*			*74.0-131*
(S) a,a,a-Trifluorotoluene	*97.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*95.8*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3300418-1 04/09/18 10:02 • (LCSD) R3300418-2 04/09/18 10:22

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzene	0.625	0.563	0.565	90.0	90.4	72.6-120			0.440	20
Naphthalene	0.625	0.635	0.617	102	98.7	69.9-132			2.96	20
(S) Toluene-d8				*93.0*	*94.4*	*80.0-120*				
(S) Dibromofluoromethane				*93.3*	*92.7*	*74.0-131*				
(S) a,a,a-Trifluorotoluene				*94.4*	*94.5*	*80.0-120*				
(S) 4-Bromofluorobenzene				*93.4*	*94.5*	*64.0-132*				

L984114-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L984114-05 04/09/18 18:33 • (MS) R3300418-4 04/09/18 20:14 • (MSD) R3300418-5 04/09/18 20:34

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Benzene	0.625	U	0.185	0.327	29.5	52.4	1	47.8-131	J6	J3	55.8	22.8
Naphthalene	0.625	0.0108	0.224	0.268	34.1	41.1	1	18.4-145			17.8	34
(S) Toluene-d8					*97.8*	*105*		*80.0-120*				
(S) Dibromofluoromethane					*86.2*	*75.3*		*74.0-131*				
(S) a,a,a-Trifluorotoluene					*98.5*	*99.6*		*80.0-120*				
(S) 4-Bromofluorobenzene					*98.0*	*99.9*		*64.0-132*				

Method Blank (MB)

(MB) R3300244-1 04/09/18 09:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*115*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3300244-2 04/09/18 09:54 • (LCSD) R3300244-3 04/09/18 10:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	25.0	19.0	18.8	75.9	75.2	50.0-150			0.991	20
Residual Range Organics (RRO)	25.0	15.9	16.5	63.6	66.1	50.0-150			3.95	20
(S) o-Terphenyl				*87.6*	*85.1*	*18.0-148*				

L983631-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L983631-01 04/09/18 13:12 • (MS) R3300244-4 04/09/18 13:25 • (MSD) R3300244-5 04/09/18 13:39

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	31.2	20.8	56.6	26.5	115	18.5	1	50.0-150		J3 J6	72.3	20
Residual Range Organics (RRO)	31.2	64.5	127	49.8	201	0.000	1	50.0-150	J5	J3 J6	87.4	20
(S) o-Terphenyl					*59.4*	*58.0*		*18.0-148*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3300857-3 04/10/18 17:06

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
(S) Nitrobenzene-d5	*86.9*			*14.0-149*
(S) 2-Fluorobiphenyl	*108*			*34.0-125*
(S) p-Terphenyl-d14	*101*			*23.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3300857-1 04/10/18 16:22 • (LCSD) R3300857-2 04/10/18 16:44

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzo(a)anthracene	0.0800	0.0651	0.0674	81.4	84.3	46.0-121			3.44	20
Benzo(a)pyrene	0.0800	0.0614	0.0635	76.8	79.4	42.0-121			3.36	20
Benzo(b)fluoranthene	0.0800	0.0687	0.0704	85.8	88.0	42.0-123			2.55	20
Benzo(k)fluoranthene	0.0800	0.0677	0.0689	84.6	86.2	45.0-128			1.78	20
Chrysene	0.0800	0.0663	0.0670	82.9	83.7	48.0-127			1.02	20
Dibenz(a,h)anthracene	0.0800	0.0695	0.0710	86.9	88.8	43.0-132			2.15	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0694	0.0707	86.8	88.4	44.0-131			1.88	20
(S) Nitrobenzene-d5				*84.1*	*82.9*	*14.0-149*				
(S) 2-Fluorobiphenyl				*89.2*	*90.9*	*34.0-125*				
(S) p-Terphenyl-d14				*79.8*	*80.1*	*23.0-120*				

L983983-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L983983-01 04/10/18 23:41 • (MS) R3300857-4 04/11/18 00:03 • (MSD) R3300857-5 04/11/18 00:25

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Benzo(a)anthracene	0.0835	0.00354	0.0760	0.0735	86.9	83.8	1	13.0-132			3.46	27
Benzo(a)pyrene	0.0835	0.00468	0.0772	0.0755	86.9	84.9	1	14.0-138			2.21	27
Benzo(b)fluoranthene	0.0835	0.00611	0.0816	0.0766	90.5	84.4	1	10.0-129			6.40	31
Benzo(k)fluoranthene	0.0835	0.00218	0.0712	0.0712	82.7	82.7	1	15.0-131			0.0440	27
Chrysene	0.0835	0.00436	0.0756	0.0728	85.3	82.0	1	15.0-137			3.70	25
Dibenz(a,h)anthracene	0.0835	0.00113	0.0754	0.0751	89.0	88.6	1	15.0-132			0.476	27

L983983-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L983983-01 04/10/18 23:41 • (MS) R3300857-4 04/11/18 00:03 • (MSD) R3300857-5 04/11/18 00:25

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Indeno(1,2,3-cd)pyrene	0.0835	0.00372	0.0774	0.0753	88.3	85.8	1	11.0-133			2.71	29
(S) Nitrobenzene-d5					*91.8*	*91.0*		*14.0-149*				
(S) 2-Fluorobiphenyl					*93.2*	*93.2*		*34.0-125*				
(S) p-Terphenyl-d14					*82.0*	*84.1*		*23.0-120*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

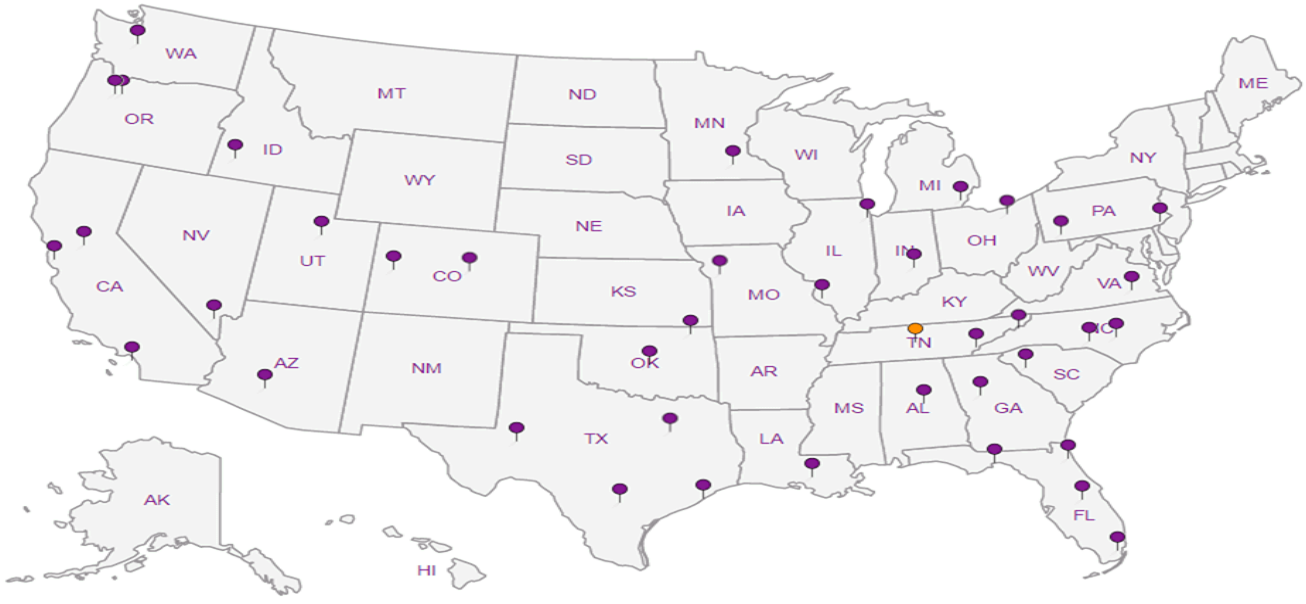
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:
Accounts Payable
1800 Blankenship Rd, Ste 440
West Linn, OR 97068

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC
LAB SCIENCES
a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.00048**

Lab Project # **SLRWLOR-NORDDOOR**

L# L9837YY

D024

Collected by (print): Steven Losleben

Site/Facility ID # **EVERETT, WA**

P.O. #

Acctnum: **SLRWLOR**
Template: **T134417**
Prelogin: **P645927**
TSR: **110 - Brian Ford**
PB: JB 3-29-18
Shipped Via: **FedEX Ground**

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	NWTPHDX LVINOSGT 40mlAmb-HCl-BT	PAHSIMLVID cPAHs 40mlAmb-NoPres-WT	V8260LLC Benz/naph 40mlAmb-HCl								Remarks	Sample # (lab only)
		~~GW~~																
		~~GW~~																
NTD-SED-0418	G	SL	4"	4/4/18	1330	~~7~~ 8JT	X	X	X									-01

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks:

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ____

Tracking # 4269 9218 7398

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)
Date: 4/5/18
Time: 230pm
Received by: (Signature)

Trip Blank Received: [✓ Yes] / No 1
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 1.2 no 40 °C
Bottles Received: 7

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature) 8C4

Date: 4/6/18
Time: 8:45

Hold:

Condition: NCF / [✓ OK]

NTD Discharge Soil Sampling

FINAL LAB REPORT

Nord Door

B3350

18-Jun-2019

Prepared by

SGS NORTH AMERICA

Prepared for

SLR International Corp

Chris Kramer

1800 Blankenship Rd, Ste 440
West Linn, OR 47068
Phone: 503-723-4423
Email: ckramer@slrconsulting.com

This report is approved by

Amy Boehm

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	Nord Door
SGS Project #	B3350
Analytical Protocol(s)	1613B
No. Samples Submitted	1
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	07-May-19
Condition Received	Good
Temperature upon Receipt (ºC)	0.4
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. ‘Xx’ denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the “D” indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the “S” indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM 5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

Sample ID: NTD-SED-A Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B2440	Date Received:	13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.97 g	Lab Sample ID	B2440_16044_DF_001	Date Extracted:	23-Jul-2018
Date Collected:	09-Jul-2018	% Solid:	89.5 %	QC Batch No:	16044	Date Analyzed:	31-Jul-2018
		Split:	-	Dilution:	-	Time Analyzed:	13:59:48

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	EMPC		1.8		ES 2378-TCDD	90.1	
12378-PeCDD	14.7				ES 12378-PeCDD	78.7	
123478-HxCDD	32.3				ES 123478-HxCDD	76	
123678-HxCDD	105				ES 123678-HxCDD	73.1	
123789-HxCDD	62.2				ES 123789-HxCDD	74.1	
1234678-HpCDD	2,540				ES 1234678-HpCDD	77.6	
OCDD	25,300			E	ES OCDD	59.1	
2378-TCDF	2.74				ES 2378-TCDF	91.2	
12378-PeCDF	6.09				ES 12378-PeCDF	77.8	
23478-PeCDF	6.84				ES 23478-PeCDF	82	
123478-HxCDF	26.7				ES 123478-HxCDF	82.8	
123678-HxCDF	EMPC		22.4		ES 123678-HxCDF	74.3	
234678-HxCDF	34.1				ES 234678-HxCDF	76.8	
123789-HxCDF	ND	0.979			ES 123789-HxCDF	85.7	
1234678-HpCDF	479				ES 1234678-HpCDF	76.4	
1234789-HpCDF	32.4				ES 1234789-HpCDF	79.4	
OCDF	1,180				ES OCDF	70.8	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	102	
Total TCDD	5.28		18.7		CS 12347-PeCDD	96.1	
Total PeCDD	75		83.8		CS 12346-PeCDF	100	
Total HxCDD	594		604		CS 123469-HxCDF	90.2	
Total HpCDD	4,200		4,200		CS 1234689-HpCDF	87.6	
Total TCDF	33.1		40.3				
Total PeCDF	156		160				
Total HxCDF	562		589				
Total HpCDF	1,290		1,300				
Total PCDD/Fs	**33,300**		**33,400**				
ITEF TEQs							
TEQ: ND=0	94.3		98.3				
TEQ: ND=DL/2	94.3	1.27	98.4				
TEQ: ND=DL	94.4	2.54	98.4				

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

Sample ID: NTD-SED-B Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B2440	Date Received:	13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.37 g	Lab Sample ID	B2440_16044_DF_002	Date Extracted:	23-Jul-2018
Date Collected:	09-Jul-2018	% Solid:	82.9 %	QC Batch No:	16044	Date Analyzed:	31-Jul-2018
		Split:	-	Dilution:	-	Time Analyzed:	14:49:08

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	2.9				ES 2378-TCDD	94.4	
12378-PeCDD	23.7				ES 12378-PeCDD	84.7	
123478-HxCDD	54.4				ES 123478-HxCDD	80.8	
123678-HxCDD	177				ES 123678-HxCDD	76.2	
123789-HxCDD	102				ES 123789-HxCDD	79.8	
1234678-HpCDD	4,410				ES 1234678-HpCDD	85.5	
OCDD	42,600			E	ES OCDD	71.5	
2378-TCDF	4.47				ES 2378-TCDF	87.5	
12378-PeCDF	8.53				ES 12378-PeCDF	77	
23478-PeCDF	18.5				ES 23478-PeCDF	82.2	
123478-HxCDF	40.2				ES 123478-HxCDF	85.3	
123678-HxCDF	40.8				ES 123678-HxCDF	76.4	
234678-HxCDF	56.2				ES 234678-HxCDF	81.1	
123789-HxCDF	ND	0.54			ES 123789-HxCDF	89.6	
1234678-HpCDF	876				ES 1234678-HpCDF	83.2	
1234789-HpCDF	57.5				ES 1234789-HpCDF	89.9	
OCDF	2,090				ES OCDF	80.4	

Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	96.8	
Total TCDD	39.7		41.3		CS 12347-PeCDD	98.5	
Total PeCDD	139		144		CS 12346-PeCDF	98.9	
Total HxCDD	1,020		1,020		CS 123469-HxCDF	90.9	
Total HpCDD	7,330		7,330		CS 1234689-HpCDF	94.6	
Total TCDF	74.4		93.1				
Total PeCDF	278		282				
Total HxCDF	1,040		1,040				
Total HpCDF	2,370		2,370				
Total PCDD/Fs	**57,000**		**57,000**				
ITEF TEQs							
TEQ: ND=0	170		170				
TEQ: ND=DL/2	170	0.878	170				
TEQ: ND=DL	170	1.76	170				

SGS

5500 Business Drive
Wilmington, NC 28405, USA
www.us.sgs.com
Tel: +1 910 794-1613; Toll-Free 866 846-8290

Checkcode: 829-128-KZP

SGS North America - DF v0.50

Report Created: 01-Aug-2018 11:12 Analyst: FS

Sample ID: Method Blank B2440_16044 Method 1613B

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Solid	Lab Project ID:	B2440	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	10.00 g	Lab Sample ID	MB1_16044_DF_SDS-RJ	Date Extracted:	23-Jul-2018
Date Collected:	n/a	% Solid:	n/a	QC Batch No:	16044	Date Analyzed:	31-Jul-2018
		Split:	-	Dilution:	-	Time Analyzed:	11:32:04

Analyte	Conc. (pg/g)	DL (pg/g)	EMPC (pg/g)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	0.306			ES 2378-TCDD	74.5	
12378-PeCDD	ND	0.163			ES 12378-PeCDD	80.6	
123478-HxCDD	ND	0.265			ES 123478-HxCDD	75.6	
123678-HxCDD	ND	0.237			ES 123678-HxCDD	75.3	
123789-HxCDD	ND	0.253			ES 123789-HxCDD	74.4	
1234678-HpCDD	ND	0.139			ES 1234678-HpCDD	84.8	
OCDD	ND	0.23			ES OCDD	77.2	
2378-TCDF	ND	0.228			ES 2378-TCDF	69.4	
12378-PeCDF	ND	0.162			ES 12378-PeCDF	65.8	
23478-PeCDF	ND	0.162			ES 23478-PeCDF	72.8	
123478-HxCDF	ND	0.165			ES 123478-HxCDF	77.7	
123678-HxCDF	ND	0.154			ES 123678-HxCDF	72.7	
234678-HxCDF	ND	0.163			ES 234678-HxCDF	80.4	
123789-HxCDF	ND	0.183			ES 123789-HxCDF	83.6	
1234678-HpCDF	ND	0.0923			ES 1234678-HpCDF	86.2	
1234789-HpCDF	ND	0.0884			ES 1234789-HpCDF	91.7	
OCDF	ND	0.358			ES OCDF	92.6	
Totals					**Standard**	**CS Recoveries**	
					CS 37Cl-2378-TCDD	93	
Total TCDD	ND	0.306	ND		CS 12347-PeCDD	102	
Total PeCDD	ND	0.163	ND		CS 12346-PeCDF	88.3	
Total HxCDD	ND	0.251	ND		CS 123469-HxCDF	94.3	
Total HpCDD	ND	0.139	ND		CS 1234689-HpCDF	105	
Total TCDF	ND	0.228	ND				
Total PeCDF	ND	0.162	ND				
Total HxCDF	ND	0.166	ND				
Total HpCDF	ND	0.0905	ND				
Total PCDD/Fs	**ND**		**ND**				
ITEF TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	0.323	0.323	0.323				
TEQ: ND=DL	0.645	0.645	0.645				

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METHOD 1613B **PCDD/F ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_09062018_22NOV2017		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	180730B36	Analysis Date:	31-JUL-2018 09:56:27
Lab ID:	OPR1_16044_DF-RJ		

NATIVE ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
2,3,7,8-TCDD	10	12.1	6.7	-	15.8	Y
1,2,3,7,8-PeCDD	50	56.6	35	-	71	Y
1,2,3,4,7,8-HxCDD	50	60.8	35	-	82	Y
1,2,3,6,7,8-HxCDD	50	62.5	38	-	67	Y
1,2,3,7,8,9-HxCDD	50	54.9	32	-	81	Y
1,2,3,4,6,7,8-HpCDD	50	56.7	35	-	70	Y
OCDD	100	126	78	-	144	Y
2,3,7,8-TCDF	10	11.5	7.5	-	15.8	Y
1,2,3,7,8-PeCDF	50	59	40	-	67	Y
2,3,4,7,8-PeCDF	50	58.5	34	-	80	Y
1,2,3,4,7,8-HxCDF	50	58.6	36	-	67	Y
1,2,3,6,7,8-HxCDF	50	59.3	42	-	65	Y
2,3,4,6,7,8-HxCDF	50	58.5	35	-	78	Y
1,2,3,7,8,9-HxCDF	50	55.6	39	-	65	Y
1,2,3,4,6,7,8-HpCDF	50	60.7	41	-	61	Y
1,2,3,4,7,8,9-HpCDF	50	57.2	39	-	69	Y
OCDF	100	117	63	-	170	Y

Contract-required concentration limits for OPR as specified in Table 6, Method 1613. 10/94

Processed: 01 Aug 2018 10:40 Analyst: FS

METHOD 1613B	**PCDD/F ONGOING PRECISION AND RECOVERY (OPR)**	**FORM 8B**

Lab Name:	SGS North America		
Initial Calibration:	ICAL: HRMS2_DF_09062018_22NOV2017		
Instrument ID:	HRMS2	GC Column ID:	ZB-5ms
VER Data Filename:	180730B36	Analysis Date:	31-JUL-2018 09:56:27
Lab ID:	OPR1_16044_DF-RJ		

LABELED ANALYTES	SPIKE CONC.	CONC. FOUND	RANGE (ng/mL)			OK
13C-2,3,7,8-TCDD	100	69.6	20	-	175	Y
13C-1,2,3,7,8-PeCDD	100	76.1	21	-	227	Y
13C-1,2,3,4,7,8-HxCDD	100	72.1	21	-	193	Y
13C-1,2,3,6,7,8-HxCDD	100	69.4	25	-	163	Y
13C-1,2,3,7,8,9-HxCDD	100	74.5	26	-	166	Y
13C-1,2,3,4,6,7,8-HpCDD	100	88.1	26	-	166	Y
13C-OCDD	200	141	26	-	397	Y
13C-2,3,7,8-TCDF	100	67.9	22	-	152	Y
13C-1,2,3,7,8-PeCDF	100	64.7	21	-	192	Y
13C-2,3,4,7,8-PeCDF	100	69.8	13	-	328	Y
13C-1,2,3,4,7,8-HxCDF	100	74.6	19	-	202	Y
13C-1,2,3,6,7,8-HxCDF	100	68.7	21	-	159	Y
13C-2,3,4,6,7,8-HxCDF	100	78.8	22	-	176	Y
13C-1,2,3,7,8,9-HxCDF	100	81.5	17	-	205	Y
13C-1,2,3,4,6,7,8-HpCDF	100	83.5	21	-	158	Y
13C-1,2,3,4,7,8,9-HpCDF	100	93.4	20	-	186	Y
13C-OCDF	200	177	26	-	397	Y
CLEANUP STANDARD						
37Cl-2,3,7,8-TCDD	40	34.6	12.4	-	76.4	Y

Contract-required concentration limits for OPR as specified in Table 6,
Method 1613. 10/94

Processed: 01 Aug 2018 10:40 Analyst: FS

Sample ID: NTD-SED-A

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Soil	Project No.:	B2440	Date Received:	13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.97 g	Sample ID:	B2440_16044_PCB_001-D2	Date Extracted:	23-Jul-2018
Date Collected:	09-Jul-2018	% Solid	89.50 %	QC Batch No.:	16044	Date Analyzed:	31-Jul-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	50.7				ES PCB-1	78
PCB-81 344'5-TeCB	ND	3.63			ES PCB-3	81.5
PCB-105 233'44'-PeCB	618				ES PCB-4	87.7
PCB-114 2344'5-PeCB	33.5				ES PCB-15	86.9
PCB-118 23'44'5-PeCB	1,370				ES PCB-19	91
PCB-123 23'44'5'-PeCB	24.3				ES PCB-37	89
PCB-126 33'44'5-PeCB	9.09				ES PCB-54	93.8
PCB-156/157 233'44'5/233'44'5'-HxCB	293			C	ES PCB-77	78.4
PCB-167 23'44'55'-HxCB	104				ES PCB-81	83.9
PCB-169 33'44'55'-HxCB	ND	10.8			ES PCB-104	107
PCB-189 233'44'55'-HpCB	EMPC		13.3		ES PCB-105	86.3
					ES PCB-114	87.4
TEQs (WHO 2005 M/H)					ES PCB-118	91.5
					ES PCB-123	103
ND = 0	0.988		0.988		ES PCB-126	67.4
ND = 0.5 x DL	1.15		1.15		ES PCB-153	98.6
ND = DL	1.31		1.31		ES PCB-155	115
					ES PCB-156/157	66.3
Totals					ES PCB-167	71.8
Mono-CB	24.7				ES PCB-169	48.1
Di-CB	339		348		ES PCB-170	143
Tri-CB	615		655		ES PCB-180	152 V
Tetra-CB	3,570				ES PCB-188	104
Penta-CB	11,400		11,400		ES PCB-189	108
Hexa-CB	9,500		9,500		ES PCB-202	81.9
Hepta-CB	2,800		2,840		ES PCB-205	92.2
Octa-CB	688		707		ES PCB-206	104
Nona-CB	353				ES PCB-208	125
Deca-CB	152				ES PCB-209	98.9
					CS PCB-28	87.7
Total PCB (Mono-Deca)	29,400		29,600		CS PCB-111	89.4
					CS PCB-178	82

Checkcode: 742-334-SVK/C SGS North America - PCB v0.82 Report Created: 01-Aug-2018 13:34 Analyst: AH

Sample ID: NTD-SED-A

Method 1668C

Client Data		Sample Data		Laboratory Data			
Name:	SLR International Corp	Matrix:	Soil	Project No.:	B2440	Date Received:	13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.97 g	Sample ID:	B2440_16044_PCB_001-D2	Date Extracted:	23-Jul-2018
Date Collected:	09-Jul-2018	% Solid	n/a	QC Batch No.:	16044	Date Analyzed:	31-Jul-2018
		Units	pg/g	Checkcode:	742-334-SVK/C	Time Analyzed:	11:23:44

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	7.19		PCB-19	[8.09]	EMPC	PCB-54	(0.774)		PCB-72	(3.54)	
PCB-2	5.6		PCB-30/18	75.1	C	PCB-50/53	57.6	C	PCB-68	(3.29)	
PCB-3	11.9		PCB-17	[31.6]	EMPC	PCB-45	55.5		PCB-57	(3.72)	
			PCB-27	8.99		PCB-51	10.4		PCB-58	(3.72)	
Conc.	24.7		PCB-24	(1.69)		PCB-46	23.2		PCB-67	6.3	
EMPC	24.7		PCB-16	37.9		PCB-52	1,110		PCB-63	8.86	
			PCB-32	24.4		PCB-73	(1.55)		PCB-61/70/74/76	741	C
Di	**Conc.**	**Qualifiers**	PCB-34	(3.17)		PCB-43	11.3		PCB-66	280	
PCB-4	13.9		PCB-23	(3.08)		PCB-69/49	191	C	PCB-55	(3.86)	
PCB-10	1.13		PCB-26/29	19.5	C	PCB-48	42.4		PCB-56	133	
PCB-9	3.04		PCB-25	9.61		PCB-44/47/65	384	C	PCB-60	64.9	
PCB-7	2.05		PCB-31	110		PCB-59/62/75	28	C	PCB-80	(3.31)	
PCB-6	[9.58]	EMPC	PCB-28/20	130	C	PCB-42	62.8		PCB-79	14.7	
PCB-5	(1.56)		PCB-21/33	66.1	C	PCB-41	25.3		PCB-78	(4.02)	
PCB-8	52.2		PCB-22	44.5		PCB-71/40	130	C	PCB-81	(3.63)	
PCB-14	(1.33)		PCB-36	3.76		PCB-64	138		PCB-77	50.7	
PCB-11	201		PCB-39	(2.89)							
PCB-13/12	8.49	C	PCB-38	(3.31)							
PCB-15	56.7		PCB-35	7.78							
			PCB-37	77.4							
Conc.	339		**Conc.**	615					**Conc.**	3,570	
EMPC	348		**EMPC**	655					**EMPC**	3,570	

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Totals	Conc.	EMPC
Mono-Tri	978	1,030
Tetra-Hexa	24,500	24,500
Hepta-Deca	3,990	4,050
Mono-Deca	29,400	29,600

Sample ID: NTD-SED-A

Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.369)		PCB-109/119/86/97/125/87	1,130	C	PCB-155	(0.593)		PCB-165	(0.818)	
PCB-96	10		PCB-117	36		PCB-152	2.57		PCB-146	283	
PCB-103	8.15		PCB-116/85	237	C	PCB-150	[1.95]	EMPC	PCB-161	(0.751)	
PCB-94	[6.43]	EMPC	PCB-110	2,420		PCB-136	240		PCB-153/168	1,360	C
PCB-95	1,520		PCB-115	(1.22)		PCB-145	(0.663)		PCB-141	370	
PCB-100/93	[8.1]	EMPC C	PCB-82	214		PCB-148	2.59		PCB-130	159	
PCB-102	37.1		PCB-111	(1.28)		PCB-151/135	638	C	PCB-137	127	
PCB-98	(2.12)		PCB-120	(1.28)		PCB-154	21		PCB-164	155	
PCB-88	(1.84)		PCB-108/124	68.9	C	PCB-144	102		PCB-163/138/129	2,160	C
PCB-91	231		PCB-107	93.5		PCB-147/149	1,610	C	PCB-160	(0.777)	
PCB-84	555		PCB-123	24.3		PCB-134	156		PCB-158	231	
PCB-89	[17.5]	EMPC	PCB-106	(1.41)		PCB-143	(1.02)		PCB-128/166	487	C
PCB-121	(1.26)		PCB-118	1,370		PCB-139/140	50	C	PCB-159	(7.09)	
PCB-92	331		PCB-122	23.4		PCB-131	48.6		PCB-162	11.4	
PCB-113/90/101	1,680	C	PCB-114	33.5		PCB-142	(1.06)		PCB-167	104	
PCB-83	69.6		PCB-105	618		PCB-132	848		PCB-156/157	293	C
PCB-99	666		PCB-127	(1.68)		PCB-133	33.8		PCB-169	(10.8)	
PCB-112	(1.34)		PCB-126	9.09							
			Conc.	11,400					**Conc.**	9,500	
			EMPC	11,400					**EMPC**	9,500	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.481)		PCB-174	414		PCB-202	39.8		PCB-208	80.3	
PCB-179	109		PCB-177	224		PCB-201	[18.3]	EMPC	PCB-207	20	
PCB-184	(0.527)		PCB-181	7.2		PCB-204	(0.622)		PCB-206	253	
PCB-176	35.3		PCB-171/173	130	C	PCB-197	4.96				
PCB-186	(0.505)		PCB-172	59.9		PCB-200	18.6		**Conc.**	353	
PCB-178	51.2		PCB-192	(2.65)		PCB-198/199	197	C	**EMPC**	353	
PCB-175	16.7		PCB-180/193	657	C	PCB-196	58.5				
PCB-187	443		PCB-191	14.5		PCB-203	115		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.86)		PCB-170	356		PCB-195	66.8		PCB-209	152	
PCB-183	219		PCB-190	60.7		PCB-194	188				
PCB-185	[30]	EMPC	PCB-189	[13.3]	EMPC	PCB-205	(5.34)				
			Conc.	2,800		**Conc.**	688				
			EMPC	2,840		**EMPC**	707				

Sample ID: NTD-SED-B

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**		
Name:	SLR International Corp	Matrix:	Soil	Project No.:	B2440	Date Received: 13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.37 g	Sample ID:	B2440_16044_PCB_002-D2-RJ	Date Extracted: 23-Jul-2018
Date Collected:	09-Jul-2018	% Solid	82.91 %	QC Batch No.:	16044	Date Analyzed: 31-Jul-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	EMPC		47.3		ES PCB-1	82.9
PCB-81 344'5-TeCB	23.6				ES PCB-3	84.1
PCB-105 233'44'-PeCB	390				ES PCB-4	89.7
PCB-114 2344'5-PeCB	EMPC		18.7		ES PCB-15	92.6
PCB-118 23'44'5-PeCB	748				ES PCB-19	98.8
PCB-123 23'44'5'-PeCB	EMPC		17.8		ES PCB-37	86.7
PCB-126 33'44'5-PeCB	ND	12			ES PCB-54	89
PCB-156/157 233'44'5/233'44'5'-HxCB	218			C	ES PCB-77	40.8
PCB-167 23'44'55'-HxCB	EMPC		75.4		ES PCB-81	53.6
PCB-169 33'44'55'-HxCB	ND	19.7			ES PCB-104	144
PCB-189 233'44'55'-HpCB	EMPC		13.6		ES PCB-105	54.7
					ES PCB-114	57.4
TEQs (WHO 2005 M/H)					ES PCB-118	67.9
					ES PCB-123	64.8
ND = 0	0.0477		0.0562		ES PCB-126	39.8
ND = 0.5 x DL	0.947		0.955		ES PCB-153	115
ND = DL	1.85		1.85		ES PCB-155	228 V
					ES PCB-156/157	80.9
Totals					ES PCB-167	103
Mono-CB	27.7		35.8		ES PCB-169	75.2
Di-CB	287		306		ES PCB-170	122
Tri-CB	442		450		ES PCB-180	96.9
Tetra-CB	2,570		2,640		ES PCB-188	97.8
Penta-CB	11,800		11,900		ES PCB-189	97.6
Hexa-CB	9,220		9,390		ES PCB-202	98.1
Hepta-CB	4,020		4,230		ES PCB-205	78.9
Octa-CB	954				ES PCB-206	144
Nona-CB	148				ES PCB-208	102
Deca-CB	89.5				ES PCB-209	99.2
					CS PCB-28	86
Total PCB (Mono-Deca)	29,600		30,100		CS PCB-111	76.4
					CS PCB-178	98

Checkcode: 009-922-DWT/C SGS North America - PCB v0.82 Report Created: 01-Aug-2018 13:36 Analyst: AH

Sample ID: NTD-SED-B

Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Soil	Project No.:	B2440	Date Received:	13-Jul-2018
Project ID:	Nord Door	Weight/Volume:	10.37 g	Sample ID:	B2440_16044_PCB_002-D2-RJ	Date Extracted:	23-Jul-2018
Date Collected:	09-Jul-2018	% Solid	n/a	QC Batch No.:	16044	Date Analyzed:	31-Jul-2018
		Units	pg/g	Checkcode:	009-922-DWT/C	Time Analyzed:	13:40:02

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	10.8		PCB-19	6.44		PCB-54	(0.967)		PCB-72	(6.26)	
PCB-2	[8.09]	EMPC	PCB-30/18	39.2	C	PCB-50/53	74.4	C	PCB-68	(5.82)	
PCB-3	16.9		PCB-17	16		PCB-45	64.6		PCB-57	(6.58)	
			PCB-27	5.26		PCB-51	15.1		PCB-58	(6.58)	
Conc.	27.7		PCB-24	(1.61)		PCB-46	31.4		PCB-67	(6.38)	
EMPC	35.8		PCB-16	19.5		PCB-52	624		PCB-63	(6.01)	
			PCB-32	15.7		PCB-73	(2.37)		PCB-61/70/74/76	537	C
Di	**Conc.**	**Qualifiers**	PCB-34	(3.19)		PCB-43	10.2		PCB-66	235	
PCB-4	[10.7]	EMPC	PCB-23	(3.11)		PCB-69/49	147	C	PCB-55	(6.83)	
PCB-10	(0.818)		PCB-26/29	13.7	C	PCB-48	34.7		PCB-56	105	
PCB-9	2.71		PCB-25	7.64		PCB-44/47/65	285	C	PCB-60	52	
PCB-7	2.55		PCB-31	76.9		PCB-59/62/75	36.5	C	PCB-80	(5.85)	
PCB-6	[8.83]	EMPC	PCB-28/20	97.9	C	PCB-42	59.9		PCB-79	[7.56]	EMPC
PCB-5	(1.88)		PCB-21/33	43.4	C	PCB-41	[18.1]	EMPC	PCB-78	(7.11)	
PCB-8	46.8		PCB-22	32.1		PCB-71/40	114	C	PCB-81	23.6	
PCB-14	(1.59)		PCB-36	5.01		PCB-64	120		PCB-77	[47.3]	EMPC
PCB-11	167		PCB-39	(2.91)							
PCB-13/12	8.58	C	PCB-38	(3.33)							
PCB-15	59.3		PCB-35	[7.55]	EMPC						
			PCB-37	63.3							
Conc.	287		**Conc.**	442					**Conc.**	2,570	
EMPC	306		**EMPC**	450					**EMPC**	2,640	

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Totals	Conc.	EMPC
Mono-Tri	757	792
Tetra-Hexa	23,600	23,900
Hepta-Deca	5,210	5,420
Mono-Deca	29,600	30,100

Sample ID: NTD-SED-B Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.788)		PCB-109/119/86/97/125/87	953	C	PCB-155	(1.4)		PCB-165	(2.87)	
PCB-96	6.99		PCB-117	30.6		PCB-152	(1.51)		PCB-146	312	
PCB-103	20.3		PCB-116/85	209	C	PCB-150	(1.45)		PCB-161	(2.63)	
PCB-94	11.9		PCB-110	2,540		PCB-136	223		PCB-153/168	1,290	C
PCB-95	2,520		PCB-115	(4.56)		PCB-145	(1.57)		PCB-141	352	
PCB-100/93	[14.8]	EMPC C	PCB-82	187		PCB-148	(3.3)		PCB-130	145	
PCB-102	58.5		PCB-111	(4.81)		PCB-151/135	865	C	PCB-137	88	
PCB-98	(7.95)		PCB-120	(4.81)		PCB-154	[20.7]	EMPC	PCB-164	157	
PCB-88	(6.88)		PCB-108/124	51.1	C	PCB-144	116		PCB-163/138/129	1,940	C
PCB-91	353		PCB-107	58.7		PCB-147/149	1,890	C	PCB-160	(2.72)	
PCB-84	846		PCB-123	[17.8]	EMPC	PCB-134	159		PCB-158	191	
PCB-89	[23.2]	EMPC	PCB-106	(5.3)		PCB-143	(3.57)		PCB-128/166	373	C
PCB-121	(4.74)		PCB-118	748		PCB-139/140	[39.3]	EMPC C	PCB-159	(15.9)	
PCB-92	390		PCB-122	16.6		PCB-131	[35.4]	EMPC	PCB-162	(15.7)	
PCB-113/90/101	1,730	C	PCB-114	[18.7]	EMPC	PCB-142	(3.73)		PCB-167	[75.4]	EMPC
PCB-83	86.3		PCB-105	390		PCB-132	861		PCB-156/157	218	C
PCB-99	596		PCB-127	(6.51)		PCB-133	36.9		PCB-169	(19.7)	
PCB-112	(5.04)		PCB-126	(12)							
			Conc.	11,800					**Conc.**	9,220	
			EMPC	11,900					**EMPC**	9,390	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(2.75)		PCB-174	607		PCB-202	51.1		PCB-208	47.9	
PCB-179	212		PCB-177	355		PCB-201	33.3		PCB-207	(9.6)	
PCB-184	(3.01)		PCB-181	(11.5)		PCB-204	(5.06)		PCB-206	100	
PCB-176	59.1		PCB-171/173	[153]	EMPC C	PCB-197	(4.74)				
PCB-186	(2.88)		PCB-172	88		PCB-200	31		**Conc.**	148	
PCB-178	93.2		PCB-192	(10)		PCB-198/199	259	C	**EMPC**	148	
PCB-175	[19.7]	EMPC	PCB-180/193	1,070	C	PCB-196	102				
PCB-187	678		PCB-191	[21.2]	EMPC	PCB-203	148		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(10.8)		PCB-170	429		PCB-195	92.7		PCB-209	89.5	
PCB-183	311		PCB-190	71.7		PCB-194	237				
PCB-185	45.9		PCB-189	[13.6]	EMPC	PCB-205	(22)				
			Conc.	4,020		**Conc.**	954				
			EMPC	4,230		**EMPC**	954				

Sample ID: Method Blank B2440_16044 Method 1668C

Client Data		**Sample Data**		**Laboratory Data**			
Name:	SLR International Corp	Matrix:	Soil	Project No.:	B2440	Date Received:	n/a
Project ID:	Nord Door	Weight/Volume:	10.00 g	Sample ID:	MB1_16044_PCB_SDS	Date Extracted:	23-Jul-2018
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	16044	Date Analyzed:	30-Jul-2018

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	0.315			ES PCB-1	65
PCB-81 344'5-TeCB	ND	0.315			ES PCB-3	66.5
PCB-105 233'44'-PeCB	ND	0.142			ES PCB-4	72.2
PCB-114 2344'5-PeCB	ND	0.15			ES PCB-15	89.6
PCB-118 23'44'5-PeCB	0.339			J	ES PCB-19	83.2
PCB-123 23'44'5'-PeCB	ND	0.138			ES PCB-37	89.4
PCB-126 33'44'5-PeCB	ND	0.0968			ES PCB-54	73
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	0.145		C	ES PCB-77	102
PCB-167 23'44'55'-HxCB	ND	0.0901			ES PCB-81	108
PCB-169 33'44'55'-HxCB	ND	0.0934			ES PCB-104	82.7
PCB-189 233'44'55'-HpCB	ND	0.127			ES PCB-105	113
					ES PCB-114	103
TEQs (WHO 2005 M/H)					ES PCB-118	106
					ES PCB-123	108
ND = 0	0.0000102		0.0000102		ES PCB-126	106
ND = 0.5 x DL	0.00633		0.00633		ES PCB-153	96.4
ND = DL	0.0126		0.0126		ES PCB-155	81.7
					ES PCB-156/157	97.3
Totals					ES PCB-167	97.6
Mono-CB	ND	0.26			ES PCB-169	90.8
Di-CB			2.95		ES PCB-170	105
Tri-CB	ND	0.455			ES PCB-180	102
Tetra-CB			0.349		ES PCB-188	87.5
Penta-CB	2.27		2.46		ES PCB-189	97
Hexa-CB	0.543		0.981		ES PCB-202	105
Hepta-CB	ND	0.108			ES PCB-205	101
Octa-CB	ND	0.0771			ES PCB-206	87.8
Nona-CB	ND	1.01			ES PCB-208	99.7
Deca-CB	ND	0.0129			ES PCB-209	89.5
					CS PCB-28	84.1
Total PCB (Mono-Deca)	2.81		6.74		CS PCB-111	104
					CS PCB-178	95.2

Checkcode: 225-366-SVN/C SGS North America - PCB v0.82 Report Created: 01-Aug-2018 13:39 Analyst: AH

Sample ID: Method Blank B2440_16044 Method 1668C

Client Data		**Sample Data**	
Name:	SLR International Corp	Matrix:	Soil
Project ID:	Nord Door	Weight/Volume:	10.00 g
Date Collected:	n/a	% Solid	n/a
		Units	pg/g

Laboratory Data			
Project No.:	B2440	Date Received:	n/a
Sample ID:	MB1_16044_PCB_SDS	Date Extracted:	23-Jul-2018
QC Batch No.:	16044	Date Analyzed:	30-Jul-2018
Checkcode:	225-366-SVN/C	Time Analyzed:	20:39:31

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(0.243)		PCB-19	(0.528)		PCB-54	(0.148)		PCB-72	(0.301)	
PCB-2	(0.303)		PCB-30/18	(0.434)	C	PCB-50/53	(0.285)	C	PCB-68	(0.281)	
PCB-3	(0.278)		PCB-17	(0.506)		PCB-45	(0.385)		PCB-57	(0.321)	
			PCB-27	(0.378)		PCB-51	(0.246)		PCB-58	(0.306)	
Conc.	0		PCB-24	(0.389)		PCB-46	(0.35)		PCB-67	(0.304)	
EMPC	0		PCB-16	(0.653)		PCB-52	(0.298)		PCB-63	(0.284)	
			PCB-32	(0.357)		PCB-73	(0.228)		PCB-61/70/74/76	(0.312)	C
Di	**Conc.**	**Qualifiers**	PCB-34	(0.378)		PCB-43	(0.341)		PCB-66	(0.327)	
PCB-4	(0.235)		PCB-23	(0.363)		PCB-69/49	(0.248)	C	PCB-55	(0.329)	
PCB-10	(0.152)		PCB-26/29	(0.371)	C	PCB-48	(0.297)		PCB-56	(0.34)	
PCB-9	(0.28)		PCB-25	(0.37)		PCB-44/47/65	[0.349]	J EMPC C	PCB-60	(0.328)	
PCB-7	(0.246)		PCB-31	(0.354)		PCB-59/62/75	(0.221)	C	PCB-80	(0.278)	
PCB-6	(0.271)		PCB-28/20	(0.382)	C	PCB-42	(0.325)		PCB-79	(0.286)	
PCB-5	(0.272)		PCB-21/33	(0.364)	C	PCB-41	(0.385)		PCB-78	(0.349)	
PCB-8	(0.254)		PCB-22	(0.399)		PCB-71/40	(0.291)	C	PCB-81	(0.315)	
PCB-14	(0.23)		PCB-36	(0.371)		PCB-64	(0.206)		PCB-77	(0.315)	
PCB-11	[2.95]	EMPC	PCB-39	(0.356)							
PCB-13/12	(0.267)	C	PCB-38	(0.396)							
PCB-15	(0.231)		PCB-35	(0.409)							
			PCB-37	(0.381)							
Conc.	0		**Conc.**	0					**Conc.**	0	
EMPC	2.95		**EMPC**	0					**EMPC**	0.349	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	Conc.	EMPC
Mono-Tri	0	2.95
Tetra-Hexa	2.81	3.79
Hepta-Deca	0	0
Mono-Deca	2.81	6.74

Sample ID: Method Blank B2440_16044 Method 1668C

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.0713)		PCB-109/119/86/97/125/87	(0.157)	C	PCB-155	(0.0768)		PCB-165	(0.0936)	
PCB-96	(0.0847)		PCB-117	(0.145)		PCB-152	(0.0794)		PCB-146	(0.108)	
PCB-103	(0.162)		PCB-116/85	(0.157)	C	PCB-150	(0.079)		PCB-161	(0.0895)	
PCB-94	(0.188)		PCB-110	0.616	J	PCB-136	(0.0863)		PCB-153/168	[0.438]	J EMPC C
PCB-95	0.625	J	PCB-115	(0.149)		PCB-145	(0.0835)		PCB-141	(0.12)	
PCB-100/93	(0.171)	C	PCB-82	(0.227)		PCB-148	(0.112)		PCB-130	(0.134)	
PCB-102	(0.16)		PCB-111	(0.13)		PCB-151/135	(0.114)	C	PCB-137	(0.109)	
PCB-98	(0.194)		PCB-120	(0.131)		PCB-154	(0.101)		PCB-164	(0.0908)	
PCB-88	(0.196)		PCB-108/124	(0.144)	C	PCB-144	(0.111)		PCB-163/138/129	(0.114)	C
PCB-91	(0.157)		PCB-107	(0.132)		PCB-147/149	0.543	J C	PCB-160	(0.0853)	
PCB-84	(0.216)		PCB-123	(0.138)		PCB-134	(0.145)		PCB-158	(0.0835)	
PCB-89	(0.205)		PCB-106	(0.14)		PCB-143	(0.112)		PCB-128/166	(0.109)	C
PCB-121	(0.129)		PCB-118	0.339	J	PCB-139/140	(0.108)	C	PCB-159	(0.092)	
PCB-92	(0.189)		PCB-122	(0.177)		PCB-131	(0.127)		PCB-162	(0.0943)	
PCB-113/90/101	0.684	J C	PCB-114	(0.15)		PCB-142	(0.124)		PCB-167	(0.0901)	
PCB-83	(0.233)		PCB-105	(0.142)		PCB-132	(0.123)		PCB-156/157	(0.145)	C
PCB-99	[0.2]	J EMPC	PCB-127	(0.142)		PCB-133	(0.119)		PCB-169	(0.0934)	
PCB-112	(0.136)		PCB-126	(0.0968)							
			Conc.	2.27					**Conc.**	0.543	
			EMPC	2.46					**EMPC**	0.981	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.0077)		PCB-174	(0.161)		PCB-202	(0.0379)		PCB-208	(0.752)	
PCB-179	(0.00831)		PCB-177	(0.159)		PCB-201	(0.0388)		PCB-207	(0.709)	
PCB-184	(0.00863)		PCB-181	(0.138)		PCB-204	(0.0405)		PCB-206	(1.27)	
PCB-176	(0.0077)		PCB-171/173	(0.159)	C	PCB-197	(0.0382)				
PCB-186	(0.00805)		PCB-172	(0.156)		PCB-200	(0.04)		**Conc.**	0	
PCB-178	(0.011)		PCB-192	(0.116)		PCB-198/199	(0.0557)	C	**EMPC**	0	
PCB-175	(0.141)		PCB-180/193	(0.125)	C	PCB-196	(0.0538)				
PCB-187	(0.139)		PCB-191	(0.115)		PCB-203	(0.0512)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(0.132)		PCB-170	(0.163)		PCB-195	(0.155)		PCB-209	(0.0129)	
PCB-183	(0.135)		PCB-190	(0.117)		PCB-194	(0.15)				
PCB-185	(0.133)		PCB-189	(0.127)		PCB-205	(0.116)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_06072017_16MAR2018
Instrument ID: MM4 GC Column ID:
VER Data Filename: 180730S10 Analysis Date: 30-JUL-2018 18:45:34
Lab ID: OPR1_16044_PCB

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)	OK
PCB-1 2-MoCB	50	114	60 - 135	Y
PCB-3 4-MoCB	50	104	60 - 135	Y
PCB-4 22'-DiCB	50	113	60 - 135	Y
PCB-15 44'-DiCB	50	101	60 - 135	Y
PCB-19 22'6-TrCB	50	109	60 - 135	Y
PCB-37 344'-TrCB	50	112	60 - 135	Y
PCB-54 22'66'-TeCB	50	109	60 - 135	Y
PCB-77 33'44'-TeCB	50	113	60 - 135	Y
PCB-81 344'5-TeCB	50	108	60 - 135	Y
PCB-104 22'466'-PeCB	50	114	60 - 135	Y
PCB-105 233'44'-PeCB	50	114	60 - 135	Y
PCB-114 2344'5-PeCB	50	121	60 - 135	Y
PCB-118 23'44'5-PeCB	50	109	60 - 135	Y
PCB-123 23'44'5'-PeCB	50	112	60 - 135	Y
PCB-126 33'44'5-PeCB	50	114	60 - 135	Y
PCB-155 22'44'66'-HxCB	50	119	60 - 135	Y
PCB-156/157 ...-HxCB	100	116	60 - 135	Y
PCB-167 23'44'55'-HxCB	50	120	60 - 135	Y
PCB-169 33'44'55'-HxCB	50	115	60 - 135	Y
PCB-188 22'34'566'-HpCB	50	126	60 - 135	Y
PCB-189 233'44'55'-HpCB	50	116	60 - 135	Y
PCB-202 22'33'55'66'-OcCB	50	101	60 - 135	Y
PCB-205 233'44'55'6-OcCB	50	111	60 - 135	Y
PCB-206 22'33'44'55'6-NoCB	50	111	60 - 135	Y
PCB-208 22'33'455'66'-NoCB	50	116	60 - 135	Y
PCB-209 DeCB	50	110	60 - 135	Y

Contract-required recovery limits for OPR as specified in Table 6, Method 1668C.

Processed: 01 Aug 2018 13:33 Analyst: AH

METHOD 1668C **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_06072017_16MAR2018
Instrument ID: MM4 GC Column ID:
VER Data Filename: 180730S10 Analysis Date: 30-JUL-2018 18:45:34
Lab ID: OPR1_16044_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)	OK
ES PCB-1	100	62	15 - 145	Y
ES PCB-3	100	59.2	15 - 145	Y
ES PCB-4	100	61.7	15 - 145	Y
ES PCB-15	100	74.1	15 - 145	Y
ES PCB-19	100	67.3	15 - 145	Y
ES PCB-37	100	74.1	15 - 145	Y
ES PCB-54	100	62.5	15 - 145	Y
ES PCB-77	100	84.1	40 - 145	Y
ES PCB-81	100	89.1	40 - 145	Y
ES PCB-104	100	72.8	40 - 145	Y
ES PCB-105	100	92.5	40 - 145	Y
ES PCB-114	100	89.4	40 - 145	Y
ES PCB-118	100	90	40 - 145	Y
ES PCB-123	100	94.4	40 - 145	Y
ES PCB-126	100	92.9	40 - 145	Y
ES PCB-153	100	81.7	40 - 145	Y
ES PCB-155	100	68.5	40 - 145	Y
ES PCB-156/157	200	86.1	40 - 145	Y
ES PCB-167	100	85.2	40 - 145	Y
ES PCB-169	100	75	40 - 145	Y
ES PCB-170	100	92.7	40 - 145	Y
ES PCB-180	100	90.1	40 - 145	Y
ES PCB-188	100	70.6	40 - 145	Y
ES PCB-189	100	91.8	40 - 145	Y
ES PCB-202	100	88.5	40 - 145	Y
ES PCB-205	100	89.6	40 - 145	Y
ES PCB-206	100	83.2	40 - 145	Y
ES PCB-208	100	92.5	40 - 145	Y
ES PCB-209	100	88.8	40 - 145	Y
CLEANUP STANDARDS				
CS PCB-28	100	81.7	15 - 145	Y
CS PCB-111	100	103	40 - 145	Y
CS PCB-178	100	91	40 - 145	Y

Processed: 01 Aug 2018 13:33 Analyst: AH

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Amy Boehm*
Receipt Date & Time:	*13-Jul-18 at 10:17*
AP Project name:	*B2440*
Requested TAT:	*21 days*
Projected due date:	*3-Aug-18*
Matrix:	*Soil*
Phone#:	*910-794-1613*
Email Address:	*Amy.Boehm@sgs.com*

Company Contact:	*Chris Kramer*
Company:	*SLR International Corp*
Project Name & Site:	*Nord Door*
Project PO#:	*108.00228.00048*
QAAP/Contract #:	*n/a*
Requested Analysis:	*Methods 1613B & 1668C*
Phone#:	*503-723-4423*
Email Address:	*ckramer@slrconsulting.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
NTD-SED-A	B2440_001	soil	2	8 oz	09-Jul-18	11:11	3.6	1	7818 1532 7160
NTD-SED-B	B2440_002	soil	2	8 oz	09-Jul-18	11:30	3.6	1	7818 1532 7160

Preservation Type: **Sample Seals:** No

Notes/Comments:

Samples received intact

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens *Logged in by: Jay Burkamper* *QC'ed by:* AK 16 Jul 18

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via: http://www.sgs.com/terms_and_conditions.htm

B2440

SGS

CHAIN OF CUSTODY

PROJECT INFO
PROJECT: Nord Door
P.O. #: 108.00228.00048
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard TAT
REPORT LEVEL: ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES:
☐ DoD ☐ EDD/Version:
☐ State of Origin:

SPECIAL INSTRUCTIONS / COMMENTS
Diox/Fur. by 1613B
PCB Congeners by 1668C

SEND DOCUMENTATION / RESULTS TO
COMPANY: SLR
CONTACT: Chris Kramer
ADDRESS: 1800 Blankenship Rd, Ste 440 West Linn, OR
PHONE: (503) 723-4423 EMAIL: ckramer@slrconsulting.com

INVOICE TO (☒ CHECK IF SAME)
COMPANY:
CONTACT:
ADDRESS:
PHONE: EMAIL:

				PRESERVATIVE	None	None											
				ANALYSIS & METHOD	Dioxins/Furans	PCB Congeners											
SAMPLE ID / DESCRIPTION	**DATE**	**TIME**	**QTY**	**MATRIX**											**MS MSD**	**MS/ DUP**	**REMARKS**
NTD-Sed-A	7/9/18	1111	2	soil	X	X											
NTD-Sed-B	7/9/18	1130	2	soil	X	X											

COLLECTED/RELINQUISHED BY (1): Steven Loskeber	**DATE:** 7/11/18	**TIME:** 1400	**RECEIVED BY:**
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY (3):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: DATE: 7/13-18 TIME: 10:17
COOLER SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT
CONTAINER SEALS: ☐ INTACT ☐ BROKEN ☒ ABSENT
CARRIER: Fedex TEMP: ºC
TRACKING #: 781815327162

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 27, 2018

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L1009317
Samples Received:	07/13/2018
Project Number:	108.00228.00048
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Chris Ward

Chris Ward
Project Manager

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

NTD-SED-A L1009317-01 Solid

Collected by	Collected date/time	Received date/time
Steven L.	07/09/18 11:11	07/13/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 160.4/2540G	WG1137897	1	07/14/18 09:27	07/16/18 14:42	MMF
Total Solids by Method 2540 G-2011	WG1138653	1	07/16/18 15:57	07/16/18 16:04	KS
Wet Chemistry by Method 350.1	WG1138238	1	07/15/18 12:54	07/16/18 09:23	KK
Wet Chemistry by Method USDA LOI	WG1138533	1	07/16/18 11:14	07/17/18 21:39	EG
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1138087	1	07/09/18 11:11	07/15/18 00:40	JHH
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1140114	40	07/18/18 10:54	07/19/18 15:46	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1139459	20	07/17/18 10:35	07/18/18 15:26	DMG

NTD-SED-B L1009317-02 Solid

Collected by	Collected date/time	Received date/time
Steven L.	07/09/18 11:30	07/13/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 160.4/2540G	WG1137897	1	07/14/18 09:27	07/16/18 14:42	MMF
Total Solids by Method 2540 G-2011	WG1138654	1	07/16/18 15:48	07/16/18 15:54	KS
Wet Chemistry by Method 350.1	WG1138238	1	07/15/18 12:54	07/16/18 09:26	KK
Wet Chemistry by Method USDA LOI	WG1138533	1	07/16/18 11:14	07/17/18 21:39	EG
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1138087	1	07/09/18 11:30	07/15/18 00:59	JHH
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG1140114	40	07/18/18 10:54	07/19/18 16:00	SHG
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG1139459	20	07/17/18 10:35	07/18/18 15:47	DMG

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris Ward

Chris Ward
Project Manager

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Gravimetric Analysis by Method 160.4/2540G

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	% of TS			date / time	
Volatile Solids	10.1		1	07/16/2018 14:42	WG1137897

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	89.1		1	07/16/2018 16:04	WG1138653

Wet Chemistry by Method 350.1

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Ammonia Nitrogen	U		1.76	5.61	1	07/16/2018 09:23	WG1138238

Wet Chemistry by Method USDA LOI

	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
TOC (Total Organic Carbon)	32800		3.33	10.0	1	07/17/2018 21:39	WG1138533

Volatile Organic Compounds (GC/MS) by Method 8260C

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Benzene	0.000713	J	0.000449	0.00112	1	07/15/2018 00:40	WG1138087
Naphthalene	0.0691		0.00350	0.0140	1	07/15/2018 00:40	WG1138087
(S) Toluene-d8	*122*	J1		*80.0-120*		*07/15/2018 00:40*	WG1138087
(S) Dibromofluoromethane	*70.9*	J2		*74.0-131*		*07/15/2018 00:40*	WG1138087
(S) a,a,a-Trifluorotoluene	*104*			*80.0-120*		*07/15/2018 00:40*	WG1138087
(S) 4-Bromofluorobenzene	*108*			*64.0-132*		*07/15/2018 00:40*	WG1138087

Sample Narrative:

L1009317-01 WG1138087: Surrogate failure due to matrix interference.

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Diesel Range Organics (DRO)	234		59.3	180	40	07/19/2018 15:46	WG1140114
Residual Range Organics (RRO)	1530		148	449	40	07/19/2018 15:46	WG1140114
(S) o-Terphenyl	*301*	J7		*18.0-148*		*07/19/2018 15:46*	WG1140114

Sample Narrative:

L1009317-01 WG1140114: Most closely resembles motor oil. Diluted due to high levels of target analytes.

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)anthracene	0.290		0.0135	0.135	20	07/18/2018 15:26	WG1139459
Benzo(a)pyrene	0.235		0.0135	0.135	20	07/18/2018 15:26	WG1139459
Benzo(b)fluoranthene	0.312		0.0135	0.135	20	07/18/2018 15:26	WG1139459
Benzo(k)fluoranthene	0.0760	J	0.0135	0.135	20	07/18/2018 15:26	WG1139459
Chrysene	0.439		0.0135	0.135	20	07/18/2018 15:26	WG1139459
Dibenz(a,h)anthracene	U		0.0135	0.135	20	07/18/2018 15:26	WG1139459
Indeno(1,2,3-cd)pyrene	0.143		0.0135	0.135	20	07/18/2018 15:26	WG1139459
(S) Nitrobenzene-d5	*58.4*	J7		*14.0-149*		*07/18/2018 15:26*	WG1139459
(S) 2-Fluorobiphenyl	*56.4*	J7		*34.0-125*		*07/18/2018 15:26*	WG1139459
(S) p-Terphenyl-d14	*52.4*	J7		*23.0-120*		*07/18/2018 15:26*	WG1139459

Gravimetric Analysis by Method 160.4/2540G

Analyte	Result % of TS	Qualifier	Dilution	Analysis date / time	Batch
Volatile Solids	11.4		1	07/16/2018 14:42	WG1137897

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.5		1	07/16/2018 15:54	WG1138654

Wet Chemistry by Method 350.1

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	U		1.86	5.92	1	07/16/2018 09:26	WG1138238

Wet Chemistry by Method USDA LOI

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	50200		3.33	10.0	1	07/17/2018 21:39	WG1138533

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00137		0.000473	0.00118	1	07/15/2018 00:59	WG1138087
Naphthalene	0.0178		0.00369	0.0148	1	07/15/2018 00:59	WG1138087
(S) Toluene-d8	*110*			*80.0-120*		*07/15/2018 00:59*	WG1138087
(S) Dibromofluoromethane	*77.9*			*74.0-131*		*07/15/2018 00:59*	WG1138087
(S) a,a,a-Trifluorotoluene	*97.4*			*80.0-120*		*07/15/2018 00:59*	WG1138087
(S) 4-Bromofluorobenzene	*105*			*64.0-132*		*07/15/2018 00:59*	WG1138087

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	452		62.5	189	40	07/19/2018 16:00	WG1140114
Residual Range Organics (RRO)	2350		156	473	40	07/19/2018 16:00	WG1140114
(S) o-Terphenyl	*366*	J7		*18.0-148*		*07/19/2018 16:00*	WG1140114

Sample Narrative:

L1009317-02 WG1140114: Most closely resembles motor oil. Diluted due to high levels of target analytes.

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzo(a)anthracene	0.117	J	0.0142	0.142	20	07/18/2018 15:47	WG1139459
Benzo(a)pyrene	0.141	J	0.0142	0.142	20	07/18/2018 15:47	WG1139459
Benzo(b)fluoranthene	0.251		0.0142	0.142	20	07/18/2018 15:47	WG1139459
Benzo(k)fluoranthene	0.0685	J	0.0142	0.142	20	07/18/2018 15:47	WG1139459
Chrysene	0.147		0.0142	0.142	20	07/18/2018 15:47	WG1139459
Dibenz(a,h)anthracene	0.0515	J	0.0142	0.142	20	07/18/2018 15:47	WG1139459
Indeno(1,2,3-cd)pyrene	0.140	J	0.0142	0.142	20	07/18/2018 15:47	WG1139459
(S) Nitrobenzene-d5	*62.8*	J7		*14.0-149*		*07/18/2018 15:47*	WG1139459
(S) 2-Fluorobiphenyl	*58.2*	J7		*34.0-125*		*07/18/2018 15:47*	WG1139459
(S) p-Terphenyl-d14	*59.7*	J7		*23.0-120*		*07/18/2018 15:47*	WG1139459

Method Blank (MB)

(MB) R3325872-1 07/16/18 14:41

Analyte	MB Result % of TS	MB Qualifier	MB MDL % of TS	MB RDL % of TS
Volatile Solids	U		0.333	1.00

L1009317-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1009317-02 07/16/18 14:42 • (DUP) R3325872-4 07/16/18 14:42

Analyte	Original Result % of TS	DUP Result % of TS	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Volatile Solids	11.4	11.7	1	2.12		5

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325872-2 07/16/18 14:41 • (LCSD) R3325872-3 07/16/18 14:41

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Volatile Solids in mg/l	400	360	364	90.0	91.0	84.0-137			1.10	5

Method Blank (MB)

(MB) R3326092-1 07/16/18 16:04

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1009277-14 Original Sample (OS) • Duplicate (DUP)

(OS) L1009277-14 07/16/18 16:04 • (DUP) R3326092-3 07/16/18 16:04

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	91.5	88.8	1	2.93		5

Laboratory Control Sample (LCS)

(LCS) R3326092-2 07/16/18 16:04

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3326091-1 07/16/18 15:54

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1009374-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1009374-01 07/16/18 15:54 • (DUP) R3326091-3 07/16/18 15:54

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	75.1	75.3	1	0.389		5

Laboratory Control Sample (LCS)

(LCS) R3326091-2 07/16/18 15:54

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3325728-1 07/16/18 08:49

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Ammonia Nitrogen	U		1.57	5.00

L1008832-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1008832-02 07/16/18 08:55 • (DUP) R3325728-4 07/16/18 08:56

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	U	0.000	1	0.000		20

L1009317-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1009317-01 07/16/18 09:23 • (DUP) R3325728-9 07/16/18 09:25

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	U	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325728-2 07/16/18 08:50 • (LCSD) R3325728-3 07/16/18 08:51

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	500	505	488	101	97.5	90.0-110			3.53	20

L1008832-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1008832-05 07/16/18 08:59 • (MS) R3325728-5 07/16/18 09:02 • (MSD) R3325728-6 07/16/18 09:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	598	U	348	353	58.2	59.0	1	80.0-120	J6	J6	1.37	20

L1008845-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1008845-01 07/16/18 09:09 • (MS) R3325728-7 07/16/18 09:10 • (MSD) R3325728-8 07/16/18 09:11

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	619	U	499	473	80.7	76.5	1	80.0-120		J6	5.34	20

Method Blank (MB)

(MB) R3326377-1 07/17/18 21:38

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TOC (Total Organic Carbon)	U		3.33	10.0

L1008589-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1008589-01 07/17/18 21:43 • (DUP) R3326377-4 07/17/18 21:41

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	100000	94300	1	6.11		20

L1008634-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1008634-03 07/17/18 21:43 • (DUP) R3326377-5 07/17/18 21:40

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	90000	86400	1	4.07		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3326377-2 07/17/18 21:38 • (LCSD) R3326377-3 07/17/18 21:38

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	3890	4980	5460	128	140	39.6-180			9.31	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3325611-3 07/14/18 19:06

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000400	0.00100
Naphthalene	U		0.00312	0.0125
(S) Toluene-d8	*105*			*80.0-120*
(S) Dibromofluoromethane	*91.6*			*74.0-131*
(S) a,a,a-Trifluorotoluene	*98.8*			*80.0-120*
(S) 4-Bromofluorobenzene	*108*			*64.0-132*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325611-1 07/14/18 16:38 • (LCSD) R3325611-2 07/14/18 17:13

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.125	0.116	0.122	92.7	97.7	72.6-120			5.29	20
Naphthalene	0.125	0.108	0.113	86.5	90.4	69.9-132			4.47	20
(S) Toluene-d8				*101*	*102*	*80.0-120*				
(S) Dibromofluoromethane				*103*	*114*	*74.0-131*				
(S) a,a,a-Trifluorotoluene				*102*	*101*	*80.0-120*				
(S) 4-Bromofluorobenzene				*102*	*103*	*64.0-132*				

L1009273-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1009273-01 07/15/18 00:21 • (MS) R3325611-4 07/15/18 01:56 • (MSD) R3325611-5 07/15/18 02:15

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.235	ND	1.58	1.67	84.1	88.8	8	47.8-131			5.47	22.8
Naphthalene	0.235	2.48	5.10	5.18	139	144	8	18.4-145			1.60	34
(S) Toluene-d8					*111*	*104*		*80.0-120*				
(S) Dibromofluoromethane					*96.2*	*102*		*74.0-131*				
(S) a,a,a-Trifluorotoluene					*101*	*102*		*80.0-120*				
(S) 4-Bromofluorobenzene					*104*	*104*		*64.0-132*				

Sample Narrative:

OS: Non-target compounds too high to run at a lower dilution.

Method Blank (MB)

(MB) R3326892-1 07/19/18 08:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*88.6*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3326892-2 07/19/18 08:49 • (LCSD) R3326892-3 07/19/18 09:01

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	25.0	21.3	21.6	85.4	86.4	50.0-150			1.22	20
Residual Range Organics (RRO)	25.0	24.1	24.0	96.6	95.8	50.0-150			0.795	20
(S) o-Terphenyl				*88.0*	*88.3*	*18.0-148*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3326602-3 07/18/18 13:58

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
(S) Nitrobenzene-d5	*71.6*			*14.0-149*
(S) 2-Fluorobiphenyl	*71.7*			*34.0-125*
(S) p-Terphenyl-d14	*79.1*			*23.0-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3326602-1 07/18/18 13:14 • (LCSD) R3326602-2 07/18/18 13:36

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzo(a)anthracene	0.0800	0.0565	0.0604	70.6	75.5	46.0-121			6.67	20
Benzo(a)pyrene	0.0800	0.0497	0.0540	62.1	67.5	42.0-121			8.29	20
Benzo(b)fluoranthene	0.0800	0.0586	0.0601	73.3	75.1	42.0-123			2.53	20
Benzo(k)fluoranthene	0.0800	0.0551	0.0633	68.9	79.1	45.0-128			13.9	20
Chrysene	0.0800	0.0564	0.0613	70.5	76.6	48.0-127			8.33	20
Dibenz(a,h)anthracene	0.0800	0.0674	0.0725	84.3	90.6	43.0-132			7.29	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0674	0.0728	84.3	91.0	44.0-131			7.70	20
(S) Nitrobenzene-d5				*67.5*	*72.9*	*14.0-149*				
(S) 2-Fluorobiphenyl				*60.3*	*63.9*	*34.0-125*				
(S) p-Terphenyl-d14				*71.3*	*71.9*	*23.0-120*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ACCREDITATIONS & LOCATIONS

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* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1 6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

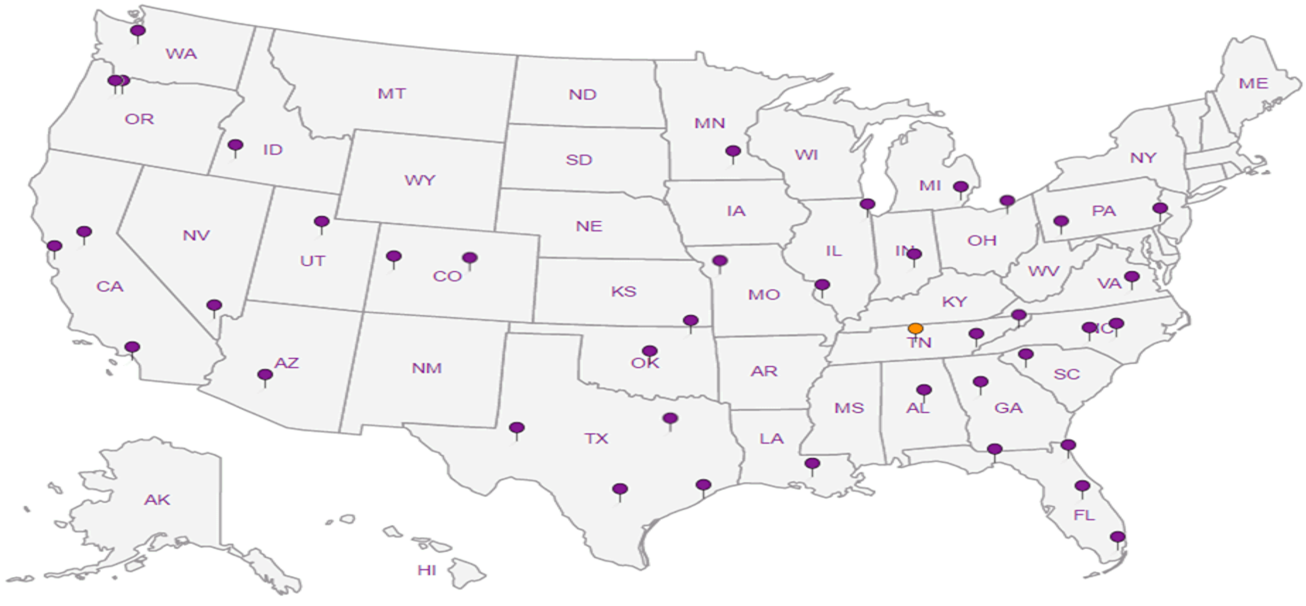
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:
Accounts Payable
1800 Blankenship Rd, Ste 440
West Linn, OR 97068

Pres
Chk

Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.00048**

Lab Project # **SLRWLOR-NORDDOOR**

Collected by (print): Steven Loskben

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature): Steve

Immediately Packed on Ice N___ Y ☒

Rush? (Lab MUST Be Notified)
___ Same Day
___ Next Day
___ Two Day
___ Three Day
___ Five Day
___ 5 Day (Rad Only)
___ 10 Day (Rad Only)

Quote #

Date Results Needed: Standard TAT

Chain of Custody Page 1 of 1

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a subsidiary of Pace

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1009317

F240

Acctnum: **SLRWLOR**
Template: **T134419**
Prelogin: **P648857**
TSR: **110 - Brian Ford**
PB:
Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	GRAIN SIZE 1L-Clr-NoPres	NH3,TOC,TS,VS 8ozClr-NoPres	NWTPHDX NOSGT 4ozClr-NoPres	~~SV8270PAHSIMD~~ cPAHs 4ozClr-NoPres	benz/naph by 8260B 40ml/NaHS04/Syr/MeOH	extra container 4ozAmb-NoPres					Remarks	Sample # (lab only)
NTD-sed-A	Grab	SS	0-2"	7/9/18	1111	8	X	X	X	X	X							-01
NTD-sed-B	Grab	SS	0-2"	7/9/18	1130	8	X	X	X	X	X							02

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:
- cPAHs by 8310 LL
- Benzene/Naphthalene by 8260B

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS ☒ FedEx __ Courier __ ______

Tracking # 4410 9283 2422

Sample Receipt Checklist
COC Seal Present/Intact: __NP [✓ Y] __N
COC Signed/Accurate: [✓ Y] __N
Bottles arrive intact: [✓ Y] __N
Correct bottles used: [✓ Y] __N
Sufficient volume sent: [✓ Y] __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature) Steve	Date: 7/11/18	Time: 1400	Received by: (Signature) 071218 1000 Pace National	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.7+0 °C Bottles Received: 16
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 7/13/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

ESC LAB SCIENCES

Cooler Receipt Form

Client: SLRWLOR SDG# L1009317

Cooler Received/Opened On: 7/ 13 /18 Temperature: ~~Amb~~ 2.7°c

AM 7/16/18

Received By: Alexandra Murtaugh

Signature:

Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	✓		
COC Signed / Accurate?		✓	
Bottles arrive intact?		✓	
Correct bottles used?		✓	
Sufficient volume sent?		✓	
If Applicable			
VOA Zero headspace?			
Preservation Correct / Checked?			

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 31, 2018

SLR International Corp. - West Linn, OR

Sample Delivery Group:	L1009324
Samples Received:	07/13/2018
Project Number:	108.00228.00048
Description:	Nord Door Project - Everett, WA
Site:	EVERETT, WA
Report To:	Chris Kramer 1800 Blankenship Road, Suite 440 West Linn, OR 97068

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Project Manager

Project Narrative

L1009324 -01, -02 contains subout data that is included after the chain of custody.

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

SDG	Sample Delivery Group.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
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Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

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State Accreditations

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Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

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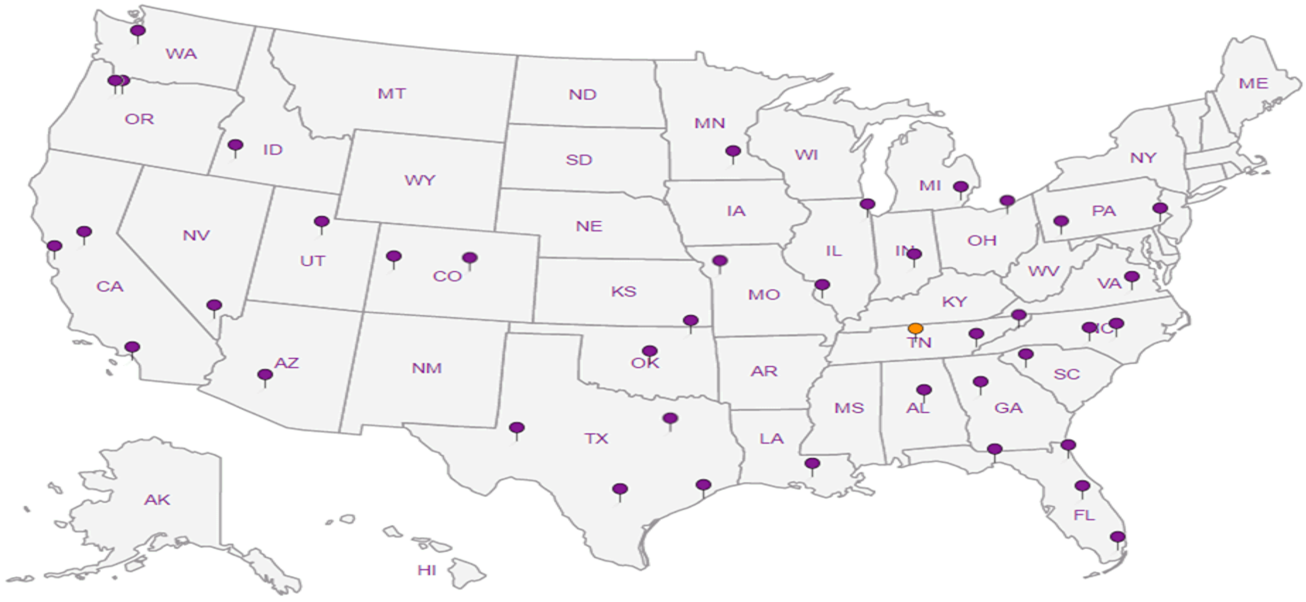

SLR International Corp. - West Linn, OR

1800 Blankenship Road, Suite 440

Billing Information:

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West Linn, OR 97068

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Chain of Custody Page 1 of 1

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12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1009324

F240

Acctnum: **SLRWLOR**
Template: **T134419**
Prelogin: **P648857**
TSR: **110 - Brian Ford**
PB:
Shipped Via:

Report to: **Chris Kramer**

Email To: **ckramer@slrconsulting.com; smiller@slrconsulting.com;**

Project Description: **Nord Door Project - Everett, WA**

City/State Collected: Everett, WA

Phone: **503-723-4423**
Fax: **503-723-4436**

Client Project # **108.00228.00048**

Lab Project # **SLRWLOR-NORDDOOR**

Collected by (print): Steven Loskben

Site/Facility ID # **EVERETT, WA**

P.O. #

Collected by (signature): Steve

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day
___ Next Day
___ Two Day
___ Three Day
___ Five Day
___ 5 Day (Rad Only)
___ 10 Day (Rad Only)

Quote #

Date Results Needed: Standard TAT

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	GRAIN SIZE 1L-Clr-NoPres	NH3,TOC,TS,VS 8ozClr-NoPres	NWTPHDX NOSGT 4ozClr-NoPres	~~SV8270PAHSIMD~~ cPAHs 4ozClr-NoPres	benz/naph by 8260B 40ml/NaHSO4/Syr/MeOH	extra container 4ozAmb-NoPres	Remarks	Sample # (lab only)
NTD-sed-A	Grab	SS	0-2"	7/9/18	1111	8	X	X	X	X	X			-01
NTD-sed-B	Grab	SS	0-2"	7/9/18	1130	8	X	X	X	X	X			02

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: - cPAHs by 8310 LL
- Benzene/Naphthalene by 8260B

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS X FedEx __ Courier ________

Tracking # 4410 9283 2422

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Steve	7/11/18	1400	07/11/18 1000
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeOH
TBR

Temp: 2.7 °C Bottles Received: 16

Date: 7/13/18 Time: 845

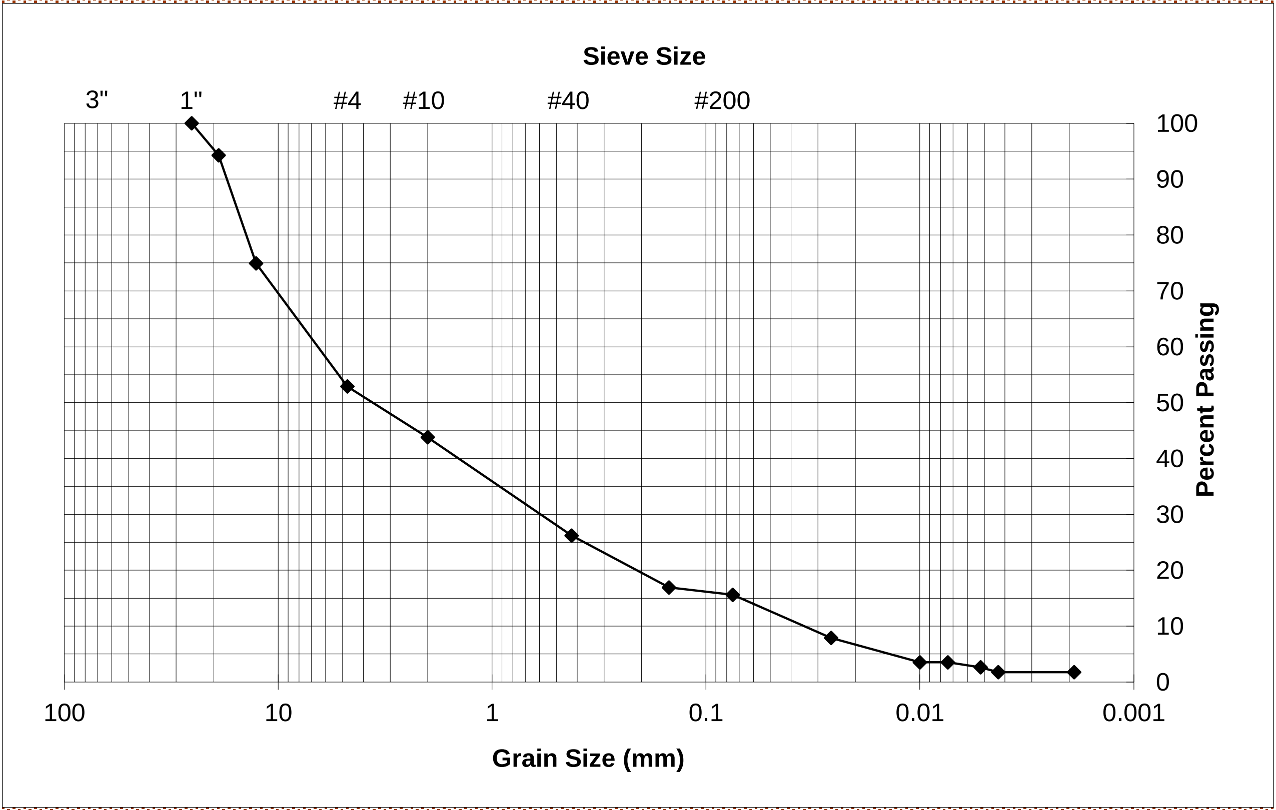
If preservation required by Login: Date/Time

Hold:

Condition: NCF / [✓ OK]

GRAIN SIZE DISTRIBUTION REPORT

ASTM D 422



PERCENT PASSING

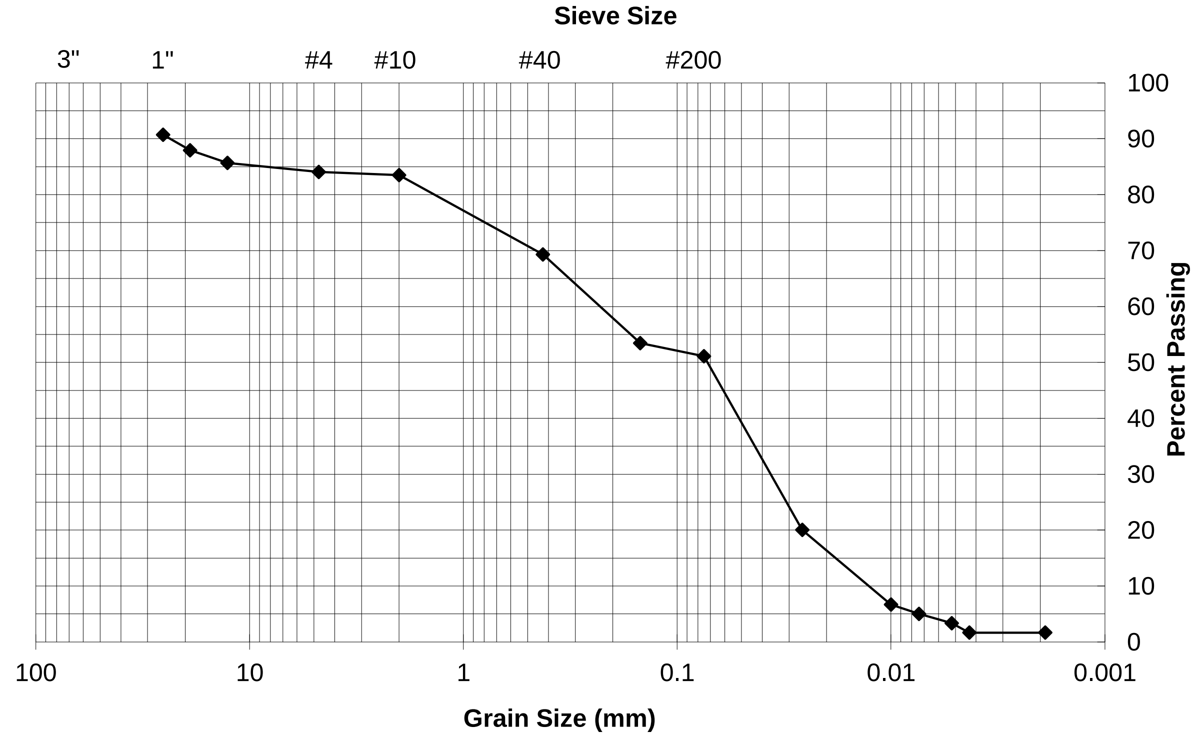
	Sieve Sizes for Mechanical Analysis								Diameters for Hydrometer Analysis (mm)					
SAMPLE ID	1.0(in)	0.75(in)	0.50(in)	#4	#10	#40	#100	#200	0.026	0.01	0.007	0.0052	0.004	0.002
L 1009324-01	100	94	75	53	44	26	17	16	8	4	4	3	2	2
	47%			**37%**				**13%**				**3%**		
LAB ID J 4913	**GRAVEL**			**SAND**				**SILT**				**CLAY**		

PROJECT: **ENVIRONMENTAL SCIENCE**
L 1009324

PROJECT NUMBER: **18-7363**

DATE: **JULY 31, 2018**

GRAIN SIZE DISTRIBUTION REPORT
ASTM D 422



PERCENT PASSING

SAMPLE ID	Sieve Sizes for Mechanical Analysis								Diameters for Hydrometer Analysis (mm)					
	1.0(in)	0.75(in)	0.50(in)	#4	#10	#40	#100	#200	0.026	0.01	0.007	0.0052	0.004	0.002
L 1009324-02	91	88	86	84	83	69	53	51	20	7	5	3	2	2
LAB ID J 4914	**16%** **GRAVEL**			**33%** **SAND**					**48%** **SILT**				**3%** **CLAY**	

PROJECT: **ENVIRONMENTAL SCIENCE**
L 1009324
PROJECT NUMBER: **18-7363**
DATE: **JULY 31, 2018**